

H6e

UNIVERSITY COLLEGE, BRISTOL.

Medical Library.

PRESENTED BY

W. J. Kelsom Millard

M. D.

June 7th 1895

Stone 579401



THE
MORBID. ANATOMY
OF THE
HUMAN EYE.

LONDON: PRINTED BY W. NICOL, 51, PALM MALL.

J. S. J. Millard

THE
MORBID ANATOMY
OF THE
HUMAN EYE.

BY
JAMES WARDROP,

SURGEON TO THE LATE KING.

ILLUSTRATED BY COLOURED PLATES.

SECOND EDITION.

VOL. II.

LONDON:
JOHN CHURCHILL, PRINCES STREET, SOHO.
1834.



Digitized by the Internet Archive
in 2015 with funding from
Jisc and Wellcome Library

https://archive.org/details/b21446854_0002

CONTENTS.

	Page
CHAP, XV. General Remarks on the Aqueous Humor and its Capsule,	1
XVI. Of Inflammation of the Capsule of the Aqueous Humor, and its Consequences,	6
1. Of the Symptoms of Inflammation,	ib.
2. Of the Effusion of Albumen,	13
3. Of Adhesions,	16
XVII. Of Ossification of the Capsule of the Aqueous Humor,	18
XVIII. Of the Diseases of the Aqueous Humor,	20
XIX. General Remarks on the Iris,	24
XX. Of Inflammation of the Iris,	35
XXI. Of Alterations in the Form of the Pupil,	40
XXII. Of the Permanent Pupillary Membrane,	46
XXIII. Of the Undulatory Motion of the Iris,	49
XXIV. Of Tumors of the Iris,	52
XXV. Of the Prolapsus of the Iris,	54
XXVI. Of Wounds and Lacerations of the Iris,	57
XXVII. General Remarks on the Choroid Coat,	60
XXVIII. Of Inflammation of the Choroid Coat,	67
XXIX. Of Dropsy of the Choroid Coat,	69

CONTENTS.

	Page
CHAP. XXX. Of Ossification of the Choroid Coat,	73
XXXI. General Remarks on the Ciliary Processes, and their Diseases,	75
XXXII. General Remarks on the Crystalline Lens, and its Capsule,	78
XXXIII. Of Cataract of the Crystalline Lens,	85
XXXIV. Of Ossification of the Crystalline Lens, . . .	104
XXXV. Of Wounds and Displacements of the Lens, .	106
XXXVI. Of Inflammation of the Capsule of the Lens,	109
XXXVII. Of Cataract of the Capsule of the Lens, .	114
XXXVIII. Of Ossification of the Capsule of the Lens, .	123
XXXIX. General Remarks on the Vitreous Humor and its Capsule,	127
XL. Of the Diseases of the Vitreous Humor and its Capsule,	132
XLI. General Remarks on the Optic Nerves and Retina,	140
XLII. Of the Sympathies of the Eyes,	149
XLIII. Of Inflammation of the Retina, and its con- sequences,	155
XLIV. Of the Morbid Sensibility of the Retina, . .	158
XLV. Of the Diseased Changes of the Retina and Optic Nerves,	164
1. Of the Diseased Changes of the Retina, ib.	
2. Of the diseased Changes of the Optic Nerves,	168
3. Of Changes in the Structure of the Op- tic Nerve, when the Eye has been de- stroyed,	174

CONTENTS.

	Page
CHAP. XLV.* Of Amaurosis,	178
1. Amaurosis from Diseases of the Brain,	180
2. Amaurosis from Poisons and Narco- tics,	189
3. Amaurosis from Wounds of the Fron- tal Nerve,	192
4. Of Amaurosis from Disorders of the Primæ Viæ,	195
5. Symptoms of Amaurosis,	199
XLVI. Of Night-Blindness,	205
XLVII. Of Coloured Vision,	210
XLVIII. Of Squinting,	216
1. Squint from Chylopoetic Derangement,	221
2. Squint from Worms,	223
3. Squint from Organic Affections of the Head,	ib.
4. Squint from Teething,	225
5. Squint from Imitation and Habit,	ib.
6. Squint from unusual Position of the Head,	226
7. Squint from Disparity in the two Eyes,	228
8. Squint from Opacities,	229
XLIX. Of Double Vision,	231
L. Of Ocular Spectra,	237
LI. Of the Disparity in the Vision of the two Eyes,	243
LII. Of the Involuntary Motion of the Eye-Ball,	248
LIII. General Remarks on the Sclerotic Coat,	252
LIV. Of Inflammation of the Sclerotic Coat, . .	258
LV. Of Staphyloma of the Sclerotic Coat,	261

CONTENTS.

	Page
Explanation of the Plates.	
Plate X.....	267
Plate XI.....	270
Plate XII.....	273
Plate XIII.....	276
Plate XIV.....	279
Plate XV.....	283
Plate XVI.....	286
Plate XVII.....	289
Plate XVIII.....	291

CHAP. XV.

GENERAL REMARKS ON THE AQUEOUS HUMOR AND ITS CAPSULE.

WHEN treating of the structure of the Cornea, it was observed, that its internal surface is lined by a polished, transparent, and firm membrane, forming part of that cavity which contains the aqueous humor.* This membrane, which has been called the Capsule of the Aqueous Humor, lines not only the cornea, but the whole of the anterior chamber. On leaving the interior surface of the cornea, it

* See Vol. I. p. 1.

extends over the anterior, and is reflected over the posterior portion of the iris, and uniting with the capsule of the crystalline lens, forms its anterior lamina. A complete bag is thus formed, which in all respects is analogous, both in its natural structure and morbid changes, to serous cavities in other parts of the body.

The Capsule of the Aqueous Humor, like other serous membranes, as the pleura, pericardium, peritonæum, and vaginal coat, forms a circumscribed cavity, which is constantly kept moist by a fluid; and it is extremely probable, that the Aqueous Humor which it contains is exhaled from the surface of that membrane, in the same manner as the fluids of other serous cavities.

Like serous membranes, too, the Capsule of the Aqueous Humor is subject to particular morbid changes. When inflamed, it acquires additional thickness; albumen is effused on its surface; adhe-

sions form between opposite portions of the membrane ; and ulceration seldom if ever takes place. It has also been found ossified ; and the fluid which it contains is subject to changes in its qualities.

The Aqueous Humor itself performs several important functions. Like the fluids of serous cavities, it lubricates and allows the free motions of the contained parts, readily admitting of the contraction and dilatation of the iris, and yielding to any changes which may take place in the eye, when viewing objects at different distances.

The Aqueous Humor, besides, forms a refracting medium for the rays of light which enter the eye ; and it has, perhaps, also, along with the crystalline lens and vitreous humour, an acromatic power.

The Aqueous Humor in the healthy eye does not exceed five drops ; but the quantity seems to vary in different eyes.

Both the colour and consistence of the

Aqueous Humor vary at different periods of life. In the fœtus, it is of a rose colour, and during the first month after birth it remains reddish and turbid. In youth it is very thin, clear, and transparent; but it becomes thicker, and less transparent, as we advance in years. In old age it is frequently whitish.* It is somewhat heavier than water, and possesses a small degree of viscosity. It is void of smell, unless when kept for some time, and then it has the odour of putrid white of egg. It is almost insipid, having merely a slight saltishness, which is only perceptible in that of old animals.† According to the analysis of Chenevix it consists of water, holding small quantities of albumen, gelatine, muriate of soda, and phosphate of lime in solution.

The Aqueous Humor possesses a remarkable power of dissolving substances accidentally deposited in it, thus becoming a means of removing extraneous mat-

* See Porterfield on the Eye.

† Ibid.

ter, by which vision might be impaired. Instances have been observed, where the point of a knife, accidentally broken while performing operations on the eye, has been rapidly oxidated, and dissolved, when deposited in the anterior chamber. The solvent power of the Aqueous Humor is also strikingly illustrated in those cases, where portions of the lens or its capsule being detached, and left floating in that fluid, are gradually absorbed.

From the view now given of the natural structure and functions of the Capsule of the Aqueous Humor, its pathology becomes extremely simple, as the different morbid changes can be illustrated by comparing them with analogous changes of structure in other serous membranes; the symptoms in the diseases of this Capsule being subject to those modifications only, which arise from the peculiar functions of the eye as the organ of vision.

CHAP. XVI.

OF INFLAMMATION OF THE CAPSULE OF THE AQUEOUS HUMOR, AND ITS CONSEQUENCES.

1.—*Of the Symptoms of Inflammation.*

INFLAMMATION and its consequences are the most remarkable morbid changes observed in the capsule of the aqueous humor. The former, as far as I know, has never been described by any author; and the latter, when noticed, have always been mentioned as distinct diseases.

When describing inflammation of the cornea,* it was remarked, that inflammation sometimes affected the external or

* See Vol. I. p. 5.

mucous covering of that organ ; sometimes its proper substance ; and that, in other cases, it was confined to its internal membrane. Since these observations were published, I have been able, distinctly, to discriminate inflammation of the Capsule of the Aqueous Humor from affections of the adjacent structures ; the inflammation, in such cases, either extending over the whole surface, or being limited to a particular portion of that capsule.

When the Capsule of the Aqueous Humor becomes inflamed, the disease is characterized, both by changes in the anterior chamber, and by the appearances of the inflamed vessels. The delicate membrane becomes opaque, and more or less of an albuminous deposition takes place on its interior surface, producing a muddiness or turbidity in the anterior chamber, and giving an appearance as if the eye-ball was unusally full and prominent.

Besides the diffused muddiness, there is often one or more spots which distinctly denote an opacity of the substance of the cornea. These do not resemble any of the common forms of speck, but have a mottled appearance; and around the more opaque white central points of these specks, there is a kind of disk, very like what is to be perceived in some agates, and what are commonly called the eyes of pebbles; an appearance, no doubt, produced from the more opaque capsule of the aqueous humour lying behind the opaque portion of cornea.

The effusion of albumen takes place, not only on that portion of the capsule of the aqueous humor which forms the interior surface of the cornea, but also in many instances on the surface of the iris, and in the pupillar opening; so that the pupil, instead of retaining its lustre and circular form, becomes more or less dim, its form irregular, and its motions limited.

The appearances of the blood-vessels are different from those in other species of ophthalmia. There is not that general redness of the white of the eye and internal palpebral membrane, accompanied with a puriform discharge, which characterizes the inflamed conjunctiva; nor is there that opacity of the cornea, and increase in the number of blood-vessels at a particular part, which take place, either in inflammation of the substance of the cornea, or of its mucous covering. A red circle of minute vessels appears on that part of the sclerotic coat, corresponding with the attachment of the iris, leaving the sclerotica between the cornea and these vessels nearly of its natural pale colour, whilst the trunks only of the inflamed vessels are seen on the periphery of the eye-ball.

Besides the red circle of inflammation which has been described, and which is probably produced by an increase in the size and number of the anterior ciliary

vessels, some vessels of the conjunctiva are also frequently enlarged. These appear as insulated trunks, and can readily be made to glide from place to place, by moving the flaccid conjunctiva, whilst those of the sclerotica, from being distributed in the substance of that tunic, appear deeply seated, and cannot be elevated with a pointed instrument, like those of the conjunctiva, or subjacent cellular membrane.*

The blood vessels are of a bright red colour during the active stage of the inflammation, and gradually assume a more crimson hue as the inflammatory symptoms subside. A difference, too, may sometimes be detected in the colour of the vessels of the sclerotica and conjunctiva.

The eye-lids participate little in this disease. There is sometimes an increased flow of tears, but the patient suffers very little pain on exposure to light, so that the eye-lids are kept open. The vision

* See Plate X, fig. 1.

is more or less dim ; and what ought particularly to be noticed, is a sensation of distention and fullness in the eye-ball, accompanied with a dull, aching, pain, generally in the forehead, sometimes also in the back part of the head :—symptoms, it may here be remarked, which are instantly and permanently relieved by evacuating the aqueous humor.

The constitutional symptoms accompanying Inflammation of the Capsule of the Aqueous Humor, vary much in the degree of their severity. Sometimes the pulse is very frequent and hard, the skin hot and dry, the tongue loaded, and the functions of the alimentary canal disordered. In other cases the disease almost from its commencement, assumes a chronic form, and, after continuing a certain period, participates in any peculiarity of the patient's constitution. Besides what may be considered as the idiopathic inflammation of the Capsule of the Aqueous Humor, that texture is particularly af-

fects in Syphilitic, Arthritic, and Rheumatic Ophthalmia.

An excellent illustration of the disease in the human eye, just described, may be observed in the Horse; the eyes of that animal being subject to a peculiar inflammation, which seems to be entirely confined to the Capsule of the Aqueous humor. It attacks the organ very rapidly, and I have sometimes seen two-thirds of the anterior chamber filled with albumen in less than twenty-four hours from the commencement of the disease. Horses of every description, and of every age, are very subject to this kind of inflammation, though it is most frequent amongst those which are young and high bred, and those in high condition. Most commonly the eyes are affected successively, but sometimes both at the same time. An animal thus affected, is very subject to a relapse; and the returns of the disease are often far distant. The albumen is generally completely and rapidly

absorbed, at least during the first attack ; but ultimately the pupil remains covered with a portion of it, the edge of the iris adheres to this matter, and vision is thus destroyed.

2.—*Of the Effusion of Albumen.**

THE effusion of Albumen invariably accompanies inflammation of all serous membranes, and more or less of this substance generally remains after the inflammatory symptoms have subsided. It has already been mentioned,† as highly probable, that Specks are produced from an albuminous effusion into the cellular texture of the Cornea ; and, when Albumen is deposited in the anterior chamber, it may be considered as one of the characteristic symptoms of the capsule of the aqueous humor having previously been inflamed.

* *Cataracta Membranco-floccosa*, or *lymphatica*.

† See Vol. I. p. 94.

During the continuance of the inflammatory symptoms, there is generally so much muddiness diffused over the whole anterior chamber, that no distinct portions of Albumen can be distinguished, unless they be of a large size ; but when this turbid state goes off, flakes will sometimes be perceived loosely attached to the surface of the iris ; and, in other instances, the whole surface of the anterior chamber is covered with a thin albuminous layer.

Albumen, when effused into the chamber, assumes a variety of appearances besides that of flakes. In some cases it floats in the aqueous humor, appearing like a thick smoke or cloud ;* in others it is deposited in streaks, having a reticulated appearance :† and in others it resembles a purulent fluid,‡ or sometimes in a solid mass which passes to and fro through the pupil.§

* See Plate XI. fig. 1.

† See Plate XI. fig. 3.

‡ See Plate XI. fig. 2.

§ See Wathen, p. 15.

Thus the colour of the albumen being a straw yellow, when combined with the natural colour of the iris, there is produced a remarkable change in the appearance of the eye. If the natural colour of the iris be blue, the addition of the yellow albumen produces a green hue;* and when the iris is brown, the admixture of the lymph gives it a lighter tint: changes which are remarkably striking, when the disease is compared with the sound eye: thus a person who has had an attack of this kind, may have a green and a blue eye.

If the portions of Albumen which have been deposited during an attack of inflammation, be not afterwards absorbed, they become organized; and, in many cases, vessels conveying red blood can be distinguished ramifying through them. This may be particularly observed, when a quantity of albumen is effused into the

* See Plate ~~XII~~ fig. 2.

aperture of the pupil, as, in such cases, one or more red vessels can sometimes be seen coming off from the edge of the iris and distributed in its substance.*

3.—*Of Adhesions.*

WHEN the capsule of the aqueous humor has been inflamed, the Albumen, effused during the inflammation becomes the medium of permanant Adhesions between different portions of the inflamed membrane. Thus, the edge of the pupil adheres to the capsule of the crystalline lens; opposite points of the pupil adhere to one another; and portions of albumen sometimes form a connection between the iris and adjacent cornea. In this manner are produced an infinite variety in the form of the pupil; and as these changes take place during an attack of inflamma-

* See Plate X. fig. 3.

tion, the aperture of the pupil is not only irregular, but generally very much contracted.

But, besides the deviation from the natural shape, and the alteration commonly produced in the colour of the iris, by an admixture of albumen, the aperture of the pupil seldom if ever remains transparent. In some cases, thin delicate webs may be distinguished passing across it; and sometimes there is a solid albuminous cake, in which blood-vessels can be traced ramifying.

A mere alteration in the form of the pupil has little effect in diminishing the powers of vision; but a very slight degree of obscurity, produced by the deposition of albumen, materially injures the sight. Thus also vision may become double or multiplied when effusion has taken place in the pupil, from the particular arrangement of the opaque matter, forming two or more apertures.

CHAP XVII.

OF OSSIFICATION OF THE CAPSULE OF THE AQUEOUS HUMOR.

FROM the morbid changes observed in the pleura, peritonæum, vaginal coat, pia mater, and in all other serous membranes, it might be expected that the Capsule of the Aqueous Humor would occasionally be found ossified. One case has already been noticed,* where a thin shell of bone was formed within the anterior chamber; and I have no doubt but in that instance, part of the capsule which lines the cornea was ossified. A similar case has since

* See Vol. I. p. 73.

come within my observation, where thin laminae of Bone were several times discharged from the anterior chamber, through ulcers formed in the cornea. I have also had an opportunity of examining a case under Mr. Wishart's care, where that portion of the capsule of the aqueous humor which is reflected over the iris, was almost entirely converted into a bony shell. It will afterwards be noticed, that, in several instances, the Capsule of the Lens has been found converted into bone, and in one case, the hyaloid membrane or Capsule of the Vitreous Humor was also found ossified. These facts make it probable, that in the other cases, the osseous laminae were formed in the capsule of the aqueous humor, all these membranes belonging to the serous class.

CHAP. XVIII.

OF THE DISEASES OF THE AQUEOUS HUMOR.

THE Aqueous Humor is subject to few morbid changes, and as these are rather to be considered as symptoms of other affections than distinct diseases, only a few general observations will here be necessary.

In some diseases of the eye, the quantity of the Aqueous Humor is increased; in others it is diminished. The former takes place in Staphyloma, and in the disease which has been called Hydroph-

thalmia ; but I have never had an opportunity of seeing an instance where there was a preternatural collection of aqueous humor, unaccompanied with some disease in the coats of the eye.*

The quantity of the Aqueous Humor is diminished in old people, as well as in many of those diseases where the form of the anterior chamber is altered or destroyed. Those who have Presbyotic eyes see better as they advance in life, from the diminution of the Aqueous Humor.

It has already been remarked, that an albuminous fluid is sometimes mixed with the aqueous humor. Blood also is sometimes diffused through it;† and it is said that in pregnant women, milk has been seen in the anterior chamber ; but such a case has never come within my observation. Woolhouse relates that he saw bladders of air, and it has even been asserted,

* See “Staphyloma,” Chap. XI. and “Alterations in the Form of the Cornea,” Chap. XII. Vol. I.

† Das Blutaug.

that particles of quicksilver have been observed in the aqueous humor.*

Prochaska mentions a case, where the Aqueous Humor was so acrid, that it tarnished the extracting knife.†

It may not be out of place to mention here, that there is a disease which frequently affects the eyes of Horses in India, occasioned by a Worm, which in size and colour, from the description I have received, may be compared to the common *Ascaris*. It seems to be generated in the anterior chamber, and can be distinguished swimming in the aqueous humor with great vigour. It causes a good deal of irritation and inflammation, the effects of which ultimately destroy the organ. The natives of India cure this disease by making an incision through the cornea, and extracting the worm. Though I have never had an opportunity of examining an eye affected with this sin-

* Sybel in Reil's Archiv. für die Physiologie.

† Voigtel's Handbuch, II. Band. p. 110.

gular complaint, circumstantial accounts from several accurate observers, leave no doubt on my mind of its actual occurrence ; and the fact accords with what is known regarding the formation of Worms in many parts of the human body, and still more frequently in the inferior animals. Bonnetus mentions that he found a Worm in the aqueous humor of a horse's eye.*

* Sepulchret, Anatom.

CHAP. XIX.

GENERAL REMARKS ON THE IRIS.

THE functions of the Iris are of considerable importance to vision. Besides regulating the quantity of light which falls upon the retina by changes in the size of the aperture of the pupil, the contraction and dilatation of that opening enables the eye to perceive objects more distinctly at different distances.*

The Iris, as has already been mentioned, is covered on both sides by the capsule of the aqueous humor,† and between these

* Vide Wood's Optics.

† Vide Chap. I. Vol. 1.

two serous laminae there are numerous blood-vessels, which form a net-work, and freely anastomose round the pupil. The Iris is also plentifully supplied with nerves, the connections of which, as shall afterwards be mentioned, explain many phenomena in diseases of the eye.

Motions of the Iris. — Though no muscular fibres can be demonstrated in the Iris of the human eye, yet from the motions it performs, their existence can scarcely be doubted. This opinion is corroborated by some animals, particularly parrots, possessing a voluntary power of contracting and dilating the pupil; and from muscular fibres having been observed in the iris of some of the larger animals.

Perhaps the motions of the Iris may have some analogy to those motions in plants produced by the influence of the sun's rays. Its motions in an eye where there is a complete cataract, or where the aperture of the pupil is drawn aside

from a part of the cornea* which has become opaque till it gets opposite to a transparent portion, makes this opinion probable. The iris, too, in many cases, retains its power of contraction and dilatation, even where the retina is completely insensible, so that it is likely that its motions do not altogether depend upon impressions made on the retina. In other cases of amaurosis, the motions of the iris are completely destroyed.

By observing the motions of the Iris of the sound eye when the diseased one is exposed to different degrees of light, the motions of the Iris of the diseased eye can be accurately determined.

In some cases of amaurosis affecting one eye, the Iris of that eye contracts and dilates, whilst corresponding changes are going on in the iris of the sound eye, from the influence of different degrees of light; but if the sound eye be excluded from light, the iris of the diseased eye remains

* See Vol. I. page 83.

inmoveable. The motion, therefore, of which the blind eye is susceptible, must entirely depend on that sympathy which is known to subsist between the two eyes, and between corresponding structures in each of these organs.

Colour of the Iris.—The Iris is of various colours, and is differently variegated in almost every individual. Some irides are of a light, and some of a dark blue shade, others are light brown, hazle brown, or of a very dark shade, variously streaked. In the Albino, the iris is of a rosy red, and when the iris is red, the choroid coat is always of the same colour. The red colour is frequent in the lower animals, particularly in those who seek their prey during the night. In an Albino from Surinam, the iris was observed of a fiery red colour, and variegated with blue and white streaks. The pupil also appeared very red.*

I have seen some people with a dark-

* See Mémoires de l'Académie de Sciences. Paris, 1734.

brown angular spot on the iris of one or both eyes. A gentleman, who had a very distinct mark of this kind, said that there was a similar one on the irides of several branches of his family.*

Sometimes the colour of the Iris is different in the eyes of the same individual. Borelli mentions having known two people, each of whom had a blue and a black iris. Sybel saw a man, the iris of whose right eye was of a dark brown, and that of the left a dark blue colour. This variety in the colour of the iris is sometimes accompanied with a corresponding variety in the colour of the ciliæ and eye-brows.

The difference in the original colour of the iris seems chiefly to depend on the colour and quantity of the pigmentum. Those whose irides are dark have it in greatest quantity, and in the Albino this colouring matter is entirely wanting, the red shade arising from the blood-vessels

* This variation in the colour of the iris produces what is called the "ring-eye" in the Horse.

shining through the delicate and transparent membrane.

Of the Pupil.—In man, the natural figure of the Pupil is circular, and is placed nearly in the centre of the iris, whereas in some animals it is of an oblong form, being so situated as best to enable the individual to extend its sphere of vision in those directions most necessary for its peculiar habits. Thus, in the graminivorous animals it is vertical, and in some beasts of prey, as cats, it is a perpendicular chink.

The Pupil also varies in size in different people; and it may sometimes be observed different in the two eyes of the same individual; probably from a difference in the convexity of the two eyes.

The pupil is generally larger in children than in adults. The pupil is also large in those who have black eyes, and a dark complexion; and in those who are very fair and have light blue eyes, it is commonly a good deal smaller. The reason of this

seems to be, that when the eye-lashes are black, the eyes are better shaded from the light, and little light will be reflected from their inner surface upon the eye; therefore the pupil, which always becomes dilated when the light is faint, will keep wider than in those who, being of a fair complexion, have their eye-lashes white; for white eye-lashes, by reflecting much light into the eye, must make the pupil contract.*

When the anterior chamber is small, the pupil is small also; and when of a full size the pupil is always larger. Hence the variety in the apparent bulk and brilliancy of the eye-ball.

In some individuals the pupil scarcely contracts at all in a bright light, whilst, in others, it is excited by the slightest glimmer. In people who live much in dark places, the pupils are more dilated than in those who are exposed to vivid lights, or employed in looking at minute

* See Porterfield on the Eye.

objects. Men who live in countries covered with snow have the pupils constantly contracted, and see clearly ; whilst those who inhabit clouded and moist climates, have them much dilated.

The effect of the extracts of *Belladonna* and *Hyoscyamus*, in producing a temporary dilatation of the pupil, is very curious ; and it is remarkable, that this effect takes place not only when these substances have been applied to the conjunctiva, but to distant parts. Raius* mentions a case where a dilatation of the pupil took place each time the leaves of the belladonna were applied to a cancerous ulcer underneath the eye ; and when an artificial dilatation of the pupil is wanted, it is easily effected by applying the extract of one or other of these plants to the eye-brow. Mr. Lawrence saw a man who swallowed by mistake a quantity of belladonna, and whose pupils became dilated in a remarkable degree, and remained so for several days.

* Historia Plantarum, p. 680.

Diseases.—Besides the Diseases of the serous surface, the other parts which enter into the composition of the Iris are subject to morbid changes ; these, however, are not numerous. A variety of changes also take place in the motions and form of the Pupil ; but these are chiefly symptoms of other diseases.

CHAP. XX.

OF INFLAMMATION OF THE IRIS.*

INFLAMMATION affects either the serous surface of the iris, or its proper substance; or it may affect both at the same time.†

From what has already been said of inflammation of the capsule of the aqueous humor,‡ it is unnecessary to detail those symptoms and appearances which are produced by inflammation of the portion

* Ophthalmia Uveæ, Iritis.

† In this respect the Iris may be compared to the lungs, inflammation of that organ being either confined to the pleura or to the parenchyma of the lungs, or affecting at the same time both these structures.

‡ See Chap. xvi.

of that membrane which covers the iris: the thickening, the discoloration, and the quantity of albumen effused on the surface of the iris, all take place and vary according to the violence and duration of the inflammatory symptoms.

In those cases where the Inflammation seems confined to the iris, the proper substance of that organ will be found chiefly affected. But although the origin of the complaint be confined to this part of the structure of the iris, yet when the symptoms are severe, its serous surfaces will also, in many cases, be observed to participate.

It has been noticed, when describing the symptoms of inflammation of the capsule of the aqueous humor, that the patient suffers little pain on exposure to light, the more remarkable symptoms being a pain in some part of the head, with a sense of fulness in the eye-ball; whereas, when the proper substance of the iris is inflamed, extreme pain on exposure to light is one

of the most striking characters of the inflammation. It may here be remarked, that the apparent redness of the eye-ball forms no certain criterion of the degree of pain which a patient suffers in any species of ophthalmia; for those parts of the organ, which in their natural state, are most influenced by light, become peculiarly sensible to it when inflamed, whilst the exposure to light seems to produce but a slight impression upon other parts, whose functions are not so immediately connected with vision, and which, from being most external, assume the reddest colour. Thus it happens that the iris, whose province is, from the peculiar sensibility with which it is endowed, to regulate the quantity of light falling upon the retina, suffers from exposure to light in a more remarkable manner than most other parts of the eye-ball, when affected with inflammation.

Besides acute pain in the eye, Inflammation of the Iris is usually accompanied

with a deep-seated pain at the bottom of the orbit, which occasionally extends through different parts of the head, and is chiefly seated in the brow. Perhaps this pain may, in a great measure, be produced by the inflammation extending to the choroid coat; the vascular connections between that tunic and the iris being very numerous.

When the Iris is inflamed, the pupil will be found very much contracted, even in a dull light; its edge becomes puckered, loses its acuteness, and appears turned back into the posterior chamber.

From the quantity of pigment which enters into its structure, the Iris does not acquire that red colour which most other parts of the body do when inflamed, the colour produced by the inflammation being such as would arise from a mixture of red blood with the natural colour of the iris, whatever that happens to be. In some cases, however, the red colour appears distinct, the blood-vessels being so

numerous as to shine through the iris. Janin relates a case of violent inflammation of the iris, where it became of a blood-red hue, resembling a piece of raw flesh.* Beer saw it blood-red in a case of nephritis. Conradi also once remarked the iris become of a blood-red colour, after a wound of the eye.†

When the serous membrane of the Iris participates in the Inflammation, besides the symptoms which have now been mentioned, more or less of an albuminous deposition takes place on its surface, producing discoloration with irregularity and opacity of the pupil, and a turbidity in the anterior chamber: appearances which have been particularly described, when treating of inflammation of the capsule of the aqueous humor.‡ The appearances of the blood-vessels in these two species of inflammation are very similar, the peculiar red circle which they form around the

* See *Traité des Maladies de l'Oeil*.

† Arneman's *Magazin*, B. I. S. 1. ‡ See Chap. xvi.

eye-ball, at a small distance from the junction of the cornea and sclerotic coat, and the deep situation of these vessels, being very striking in both cases,—a similarity which, no doubt, arises from the blood-vessels which supply the two structures, being both branches of the anterior ciliary arteries.

Inflammation of the Iris is excited by a variety of causes. It is particularly apt to be occasioned by exposure to bright and dazzling lights. It sometimes accompanies phrenitis; and, as far as I have been able to observe, the iris is more liable than any other part of the eye to be affected with venereal inflammation.*

When inflammation is excited in the Iris of one eye, it sometimes happens that the iris of the other eye is in like manner affected. In one instance this was remarkable: the iris of one eye being inflamed in consequence of a punctured wound, when soon afterwards the iris of

* See Venereal Ophthalmia.

the other eye became similarly affected. This sympathy, which subsists not only between the two eyes, but between the similar parts of each of these organs, is illustrated by many other diseases, as well as by those of the iris.*

* See Sympathy of the Eyes, Chap. xvi.

CHAP. XXI.

OF ALTERATIONS IN THE FORM OF THE PUPIL.

NEITHER the size of the Pupil, nor the extent of the motions of the iris, are always equal in both eyes ; and in some instances, I have observed this difference to be very considerable, and usually accompanied with a disparity in the vision of the two eyes.

Malconformations.—It sometimes happens that there is an original malconformation in the figure of the human Pupil. In a child a few months old the pupils of

both eyes were observed to be of an irregular form, and they readily altered their size when exposed to different degrees of light. Reil* saw a man in whose right eye the pupil extended downwards to a small sharp point. In the left eye the pupil was round, but its upper edge was so situated in the centre of the iris, that the under-part of the iris was scarcely to be observed. Kühn† saw a young woman born with a pupil of a rectangular shape, which was immoveable, not being lessened by a bright, nor enlarged by a dull light. Himly has observed cases where the pupillar opening was not circular, but indented. In one eye he saw seven indentations, so that the margin of the pupil formed seven small semicircles. The vision of this eye was sound, the motions of the iris natural, and there had been no injury of the eye. This peculiarity in the iris he conceived to

* See Archiv. für die Physiologie.

† See Naturahistorische Bemerkungen.

arise from an irregularity in the disappearance of the pupillary membrane.

Malconformations of the Pupil are sometimes *hereditary*. Block* knew a family in whom the father, with his children, nephews, and nieces, had long-shaped pupils. One of the daughters and one of the nephews had the pupil in one eye oval, and in the other it was circular. Conradi† mentions that he knew a father, daughter, and grand-daughter, in whom the under margin of the pupil was as it were, cut out; the pupil consequently was not round, but oval, and run oblong to a point at the lower part. Hagström‡ saw a whole family, in which each member had such a large oval-shaped pupil, that the under edge of the iris was quite vanished. Acrell§ saw a similar deformity, which was hereditary.

* See Medic. Bemerkungen.

† See ibidem.

‡ Handbuch d. Path. Anat. §. 517.

§ See Med. Bemerkungen.

Sometimes there is more than one opening in the iris, from original malconformation. In the cabinet of Meckel there is a calf's eye preserved, the iris of which has two regular formed pupils close to one another. Sometimes a double Pupil is met with in an eye whose parts are single; and sometimes both lens and pupil have been found double.*

Changes from Disease.—The form of the Pupil undergoes various changes from disease.

In some people the Pupil is not quite circular, from a portion of the iris having lost its power of contraction and dilatation; at least I have observed several cases, in which one part of the edge of the pupil remained immoveable, whilst the others dilated and contracted, no adhesions or any alteration in structure being perceptible. In some cases this want of motion seemed to be only at one point, and in others it extended to a

* See Voigtel's Handbuch.

large portion of the circumference of the pupil. The same loss of power may sometimes be observed in a particular portion of the iris, where it has sustained an injury from the extracting knife.

When the iris has suffered from inflammation, the Pupil is frequently found not exactly in the centre of the iris, and it seldom regains its circular form and natural extent of motion, the edge of the iris forming adhesions either to the capsule of the crystalline lens or to the cornea.

In a number of instances, by the shape and mobility of the Pupil, an opinion may be formed of the sensibility of the retina. It sometimes happens that the pupil is dilated to such a degree, that the iris appears merely as a streak round the circumference of the cornea, this being always the symptom of some other disease. A great dilatation of the pupil may generally be observed where there is a wound of the ciliary ligament; and I have always observed the dilatation

equally great in those cases where vision has been destroyed by a wound of the frontal nerve; an effect which may probably be accounted for from the connection which the frontal branch of the fifth pair of nerves has with the nerves of the iris.

CHAP. XXII.

OF THE PERMANENT PUPILLARY MEM- BRANE.*

ALL the natural openings have been found closed from original malconformations of structure. The meatus of the external ear, the nostrils, the vagina, the rectum, and the urethra, have been found obliterated ; and the same thing has been met with, though very rarely, in the pupil.

The membrane which shuts up the pupillary opening in the foetus, and forms a

* Sinizesis Congenita.

partition between the two chambers, is seldom visible at birth, but may be seen in a child of the sixth or seventh month. It is very vascular, receiving its supply of blood from the iris.

When the Pupillary Membrane is not absorbed before birth, it appears in the form of an opaque web, which is easily distinguished from cataract by being vascular, by the size of the pupil being unalterable, and being on the same plane with the iris.

In one case the Pupillary Membrane remained perfectly apparent until the sixth week after birth, at the end of which period it spontaneously disappeared. Wrisberg* saw a boy four years of age, in whom this membrane was perfectly entire. Cheselden operated on a boy ten years old, who had this membrane imperforated. Borthwick† mentions an obliteration of the pupil in which a complete tunic of a

* See Haller, Nov. Comment. Gott. Tom. II.

† See Med. and Phys. Com. Edin. Vol. I.

hard nature separated the two chambers of the eye, and adhered around the margin of the iris. Wenzel also mentions the case of an adult, where the pupillary membrane of one eye remained unabsorbed.*

* See Manuel de l'Oculiste, p. 416.

CHAP. XXIII.

OF THE UNDULATORY MOTION OF THE IRIS.

IN some cases where the operation for cataract has been performed, and where the iris remains apparently uninjured and the pupil of its natural form, the Iris has a very singular undulatory motion, being agitated to and fro like a piece of cloth exposed to a fluctuating wind.

From this state of the Iris, vision does not seem to be injured, but the pupil no longer retains the power of contracting and dilating so freely as usual. This appearance has, in most cases, been observed

soon after the operation, and has continued afterwards during life.

In people born blind with amaurosis, or with cataract, the same singular appearance may often be observed ; and I have also remarked it in cases of blindness produced from injuries.

In some cases where the Iris is subject to this undulatory motion, the whole eye-ball also has a peculiar goggling and involuntary action. In some cases of cataract, too, the opaque lens partakes of this tremulous motion of the Iris.*

It may be difficult to give a satisfactory explanation of this curious diseased motion of the Iris, and it may not, in all cases, depend on the same cause. But as in most instances when this tremulous motion occurs, the vitreous humor has become converted into a watery fluid, probably the Iris, from being thus loose and unsupported, partakes of all those undulations of the aqueous humor which

* The "Cataracte Tremblante" of the French.

take place when the form of the eye-ball changes to view objects at different distances. In cases of cataract where the lens is dislocated, and lies loose in the anterior chamber, the motions which the iris then receives, make it probable that its undulatory motions are produced by the fluctuation of the aqueous humor.

CHAP. XXIV.

OF TUMOURS OF THE IRIS.*

SMALL tumours, which have been called Polypi, are sometimes, though rarely, found on the Iris.

In the cabinet of Meckel, there is a preparation where the pupil is shut up by a polypous excrescence.

Beer mentions cases where “fleshy tumours” were found growing from the inner margin of the iris.†

I have seen only one example of a tumour growing from the Iris, and in this

* Hyperauxesis Iridis.

† Lehre der Augenkrankheiten.

instance though of long standing, it had acquired but a small size. It seemed, however, extremely vascular, for frequently without any external cause, it bled profusely, and would in a short time fill the anterior chamber with blood. Tumours of this description are said by Lower to be frequently found growing from the iris of the Horse.

CHAP XXV.

OF THE PROLAPSUS OF THE IRIS.*

A PORTION of iris is occasionally prolapsed through a wound of the cornea. But the most frequent cause of a Prolapsus of the Iris, is when an ulcer erodes the cornea, and penetrates into the anterior chamber. The aqueous humor then escapes, and by the contents of the posterior chamber being pressed forwards, a portion of iris is thrust through the ulcer of the cornea, and forms a small projecting tumor.

* Der Vorfall der Regenbogenhaut—Hernia Iridis, Moceyphalon — Tête de Mouche. — Melon—Hilon—Ptosis Iridis—Staphyloma Iridis.

When a portion of cornea is destroyed by ulceration, or gives way, from the over-distention which takes place during a violent attack of ophthalmia, the prolapsus of the iris is in this case, accompanied with a discharge of the aqueous humor, by which the inflammatory systems are greatly alleviated. But this accident is often succeeded by great pain; for the iris is not only kept preternaturally stretched by being dragged from its natural situation, but it becomes strangulated, and violent inflammation ensues.

If the inflammatory symptoms be not alleviated by proper treatment, and the tumour be left untouched, a complete adhesion is formed between the iris and contiguous cornea. The size of the pupil is thus more or less diminished, its form and situation altered, and, usually, after a tedious process, the prolapsed portion of iris is covered by albumen, which defends it from external agents.

When a portion of Iris comes through

an ulcer of the cornea it sometimes assumes a granular appearance, and resembles a portion of flesh. The same fungous appearance is sometimes produced when the testicle protrudes through the ulcerated scrotum, or the dura mater is exposed from a portion of cranium being removed ; these surfaces being of a similar structure.

CHAP. XXVI.

OF WOUNDS AND LACERATIONS OF THE IRIS.

THE iris is occasionally wounded both from accidents, and during operations.

Simple wounds of the Iris are not attended with pain, neither do they excite that degree of inflammation which has generally been supposed to follow wounds of this part of the eye. But when they are accompanied with more extensive injury, and when any portion of the iris is displaced, or bruised, the consequences are often alarming.

Wounds of the Iris are always followed by more or less inflammation, accompa-

nied by an effusion of lymph ; but, as that membrane is exposed to constant motion, from the dilatations and contractions of the pupil, the edges of the wound seldom adhere.

The Iris is frequently torn from blows and injuries of the eye, and the laceration generally takes place at the union of the Iris with the ciliary ligament. This sometimes happens in such a manner, that a second pupil is formed, whilst, in other instances, the disunion is much more extensive ; and I have seen nearly the whole Iris dragged to the centre of the eye, being almost entirely detached from the ciliary ligament. In one case, where a thorn penetrated the eye, after the subsequent inflammation was removed, the whole of the Iris was found to have disappeared, except a very narrow stripe, which extended across the eye-ball.* The vision of this eye remained extremely indistinct, unless assisted with a convex glass,

* See Plate XII. fig. 2 and 3.

or by looking through a small hole made in a card ; by either of which means the patient could read a small printed book. Richter saw in a man, who had fallen from a horse on his head, a complete want of the natural pupil ; “ but there was an opening on the upper part of the iris, which was occasioned by a separation of that tunic from the ciliary ligament.” Through this opening the patient could see objects clearly at ten and twelve paces distant ; but when he approached near, he saw only the under half.* Beer saw in a young woman, who fell without injury from a second floor, the pupils in both eyes become immediately immoveable, and in one of them the Iris sparated from the ciliary ligament in such a manner as to form two pupils, through which the patient saw only the half of all objects.†

The easy manner by which the Iris can

* See Chirurg. Bib.

† See Lehre der Augenkrankheiten.

be detached from its union with the ciliary ligament, makes this accident by no means unusual, and led Scarpa to think of detaching the iris from the ciliary ligament, in order to form an artificial pupil in those cases where such an operation was required.

After the Iris has been disunited from the ciliary ligament, a permanent opening is formed between the two chambers, and the new pupil does not interfere with the functions of the old one, nor does it in any manner disturb vision, unless when the injury is very extensive.

In those cases which I have had an opportunity of examining, the form of the new opening was unchangeable, neither contracting nor dilating by alterations of light. Wenzel,* however, mentions a case where the contrary was observed. “ I have seen an instance of a laceration of the iris which presented a very singular appearance. The laceration had taken

* See Manuel de l'Oculiste.

place at the inferior and nasal part of the iris, and formed a second pupil which was nearly oval. This pupil had existed more than twenty years, and had never affected the sight, and it had been formed without any pain or disease, and without any accident that could be recollected. A beginning opacity could easily be perceived in the crystalline lens of both eyes; but I was much surprised to remark in the right eye, where the disunion of the iris had taken place, a very apparent motion of contraction and dilatation in the new formed pupil."

CHAP. XXVII.

GENERAL REMARKS ON THE CHOROID COAT.

THE structure of the Choroid Coat in some respects resembles that of the iris, which has led to the opinion that they were continuations of one another.

Besides having on its interior surface a layer of black pigment, the Choroid Coat is composed of a thin delicate membrane, divisible into two laminae. The exterior surface is smooth, having no adhesion to the sclerotic coat, but from a few vessels, and like other serous surfaces it is kept constantly moist by an exhaled fluid. The interior surface has no connection with the

retina, a slimy fluid being interposed between the black pigment and the nervous expansion. The Choroid Coat may therefore be considered as a double serous membrane, and forms two distinct serous cavities; for it is not probable that the two cavities communicate in the sound eye, as air blown through a wound of the sclerotic coat readily passes every where between the sclerotic and choroid coats, but never enters into the anterior chamber.

The Choroid Coat is extremely vascular, and is plentifully supplied with Nerves, the principal branches of which pass as far as the ciliary ligament, and are distributed on the iris and perhaps also on the ciliary processes.

There is no reason to suppose that the Choroid Coat has, like the iris, any muscular fibres, nor are the functions of these two membranes at all similar.

From the number and particular disposition of the blood-vessels of the Choroid Coat, it probably performs some

important office. It is generally supposed to be the organ for secreting the black pigment; and, in some cases of disease, where there was an inordinate secretion of this pigment, I have found the choroid coat thickened.* The choroid coat, however, is probably concerned also in some other function, for it is to be found in the Albino, and in those animals in whose eyes the black pigment is entirely wanting.

The diseased changes of the Choroid Coat are not only extremely few, but they have been rarely discriminated. Like other serous membranes, it is subject to inflammation; its vessels are subject to various enlargement; a preternatural quantity of fluid has been found in both its cavities; and it is subject to ossification.

Klinkosch has found the Choroid Coat entirely wanting, from original malconformation. When the eye-ball is affected with Fungus Hæmatodes, the choroid coat

* See Fungus Hæmatodes of the Eye.

appears to be intimately connected with the diseased changes which take place in that formidable complaint; being generally found very much thickened and redder than natural, and sometimes completely blended with the diseased mass.*

The quantity of black pigment varies in some diseased states of the eye. In eyes that have been long disorganized, the choroid coat has been found extremely tender, and of a pale colour, with a very small quantity of black pigment. In one case I found the natural polished exterior surface of the choroid coat destroyed at one spot, having there acquired a granulated appearance.

The total want of the black pigment in man and in animals is always congenital, and is usually connected with a want of the colouring principle of the skin, hair, or feathers. It is hereditary in some animals, as in rabbits, mice, and a race of

* See Fungus Hæmatodes of the Eye.

Hanoverian horses, so as to form a constant breed of white animals.

Portal* says that he has found Hydatids between the Choroid Coat and retina.

* See Anatomie Médicale par Portal.

CHAP. XXVIII.

OF INFLAMMATION OF THE CHOROID COAT.

THE Choroid Coat is occasionally inflamed, the inflammation, in some instances, originating in that tunic, and in others extending to it from some contiguous inflamed part.

Inflammation of the Choroid Coat is attended with great intolerance of light, and pain at the bottom of the orbit, darting through the head. There is little external redness, and the inflamed vessels which appear on the white of the eye are deep-seated, being the posterior ciliary arteries. The pupil is contracted, and the anterior

chamber appears large, from the iris having an inclination backwards. This disease occurs most frequently in strong plethoric people, and is always attended with a considerable degree of symptomatic fever.

In diseased eyes, I have several times found, on dissection, the choroid coat turgid with red vessels. Larrey* found the interior surface of the choroid coat of a brownish colour, subsequent to an attack of inflammation, which was probably produced from effused albumen. In one case, the inflammation of the choroid coat was so violent, that suppuration took place, a puriform fluid being discharged through an opening in the sclerotic coat.

There are some cases of painful and defective vision, which are usually considered as diseases of the retina, but which are probably connected with affections of the vessels of the choroid coat.

* See *Mémoires de Chirurgie Militaire et Campagnes* par Larrey, Tom. 1. p. 220.

CHAP. XXIX.

OF DROPSY OF THE CHOROID COAT.

IT has already been remarked, that the Choroid Coat may be considered as a double serous membrane, forming two distinct cavities, each of which is constantly kept moist by exhalation, in the same manner as similar cavities in other parts of the body. The exhaled fluid being sometimes collected in these cavities in a preternatural quantity, the disease may properly be denominated the Dropsy of the Choroid Coat.

The fluid may be collected in this disease either between the choroid coat and retina, or between the choroid and sclerotic

coats. From this it is probable that the functions of the two laminae of the choroid coat are independent of each other, and that the one may be diseased whilst the other remains unchanged ; an observation which may be made in other organs where there are two surfaces, as in the intestines, lungs, and bladder.

I have had an opportunity of dissecting several eyes where a serous fluid had collected between the Choroid Coat and Retina. In these cases, the retina and vitreous humor were displaced and compressed by the morbid collection of water ; the vitreous humor being more or less absorbed, whilst the retina was shrivelled up, and formed a white bundle, extending through the centre of the eyeball, from the entrance of the optic nerve to the posterior part of the crystalline capsule. The choroid coat was unchanged.*

Mr. Ware mentions a case of this disease, where, on dissection, he found “ a

* See Plate XVII.

considerable quantity of a yellow-coloured fluid, as thin as water, accumulated between the choroid coat and retina; the retina itself being collapsed, and resembling a cone of a white colour, the apex of which was at the entrance of the optic nerve, and the base surrounded the crystalline humor, the vitreous humor being absorbed.” * Verle and Zinn describe similar cases.†

It will be difficult to distinguish this disease in the living body, by any symptoms or appearances of the eye, as these much resemble some other affections of the posterior chamber, and, as there is no change in the form of the eye-ball. When the accumulation of water has taken place slowly, the loss of vision has been gradual, and the accompanying pain and redness have not been great. In other

* See Surgical Observations on the Eye, Vol. I. p. 510.

† See Zinn de Oculo, p. 25. Scarpa also mentions a case of this disease, but he describes it as a dropsy of the vitreous humor.

cases, the water collects quickly, and is accompanied with great pain, particularly in the head ; the pupil becomes much dilated, and when the disease has far advanced, there is an appearance of an opaque body behind the lens, from the retina being compressed, which in one instance, was mistaken for cataract, and an attempt made to couch it.

In the disease now described, the water has always been found collected between the choroid coat and retina; but in a few instances, a watery fluid has been observed between the choroid and sclerotic coats ; and this has led some authors to suppose that there was a communication between the cavity formed by these two tunics and the anterior chamber.*

Withousen of Copenhagen dissected the eyes of a man born with amaurosis, and found a quantity of glairy fluid, like white of egg, effused between the retina and choroid coat.

* See Zinn de Oculo Humano.

CHAP XXX.

OF OSSIFICATION OF THE CHOROID COAT.

I HAVE met with a few instances where a thin cup of Bone was found between the sclerotic coat and retina.* In all these cases the ossifications were exactly similar. At the bottom of the cup, there was a small round perforation, through which the retina passed to expand on the interior surface of the osseous shell. The retina was in immediate contact with the interior surface of the bone, but between the sclerotic coat and ossification there was a very thin, tender, and pale-coloured membranous expansion, the only vestige

* See Plate XVI. fig 3.

of the choroid coat. Bichât relates two instances, and similar cases are also mentioned by Haller, Morgagni, Walter, Peller, Morand, Scarpa, and Günz.

That the ossifications in these cases were a diseased change in the choroid coat, is extremely probable, both from their situation, and from their resemblance to the choroid coat in form. Besides, ossification is a morbid change, to which all other serous membranes are subject. It has been already noticed, that this change has been met with in the capsule of the aqueous humor; and bony matter has also been found deposited in the capsules of the crystalline lens and vitreous humor.*

* See Chap. XLI.

CHAP. XXXI.

GENERAL REMARKS ON THE CILIARY PROCESSES AND THEIR DISEASES.

THE Ciliary Processes, like the choroid coat and iris, are covered with a black pigment, and float in a serous cavity, into which they may be considered as forming prolongations. But neither the structure nor the functions of the ciliary processes are fully understood. It is well known, that they are extremely vascular, but whether they are supplied with nerves, and are muscular, or whether they are employed in regulating the position of the crystalline lens, to enable the eye to look at objects at different distances, physiolo-

gists have not yet been able to determine. From their structure, however, it is extremely probable that their functions are important.

Diseases.—The Diseases of the ciliary processes are little known. They probably participate in general inflammation of the internal parts of the eye; and they are involved in many of those diseases to which the adjacent structures are subject.

Wounds of the Ciliary Processes are said by Beer to be always followed by blindness, and an extraordinary dilatation of the pupil. It is a fact well established, that a wound of the frontal branch of the fifth pair of nerves is generally followed by complete blindness, with a great dilatation of the pupil; and from whatever cause the blindness may in such cases be produced, the connection between the ciliary nerves, and the frontal branch of the fifth pair, might lead us to expect that a wound of the ciliary nerves themselves would have a like influence on the retina.

I have observed several cases of wounds which penetrated the sclerotic coat, followed by a complete amaurosis, accompanied with a pupil very much dilated. In such cases, it is probable that the ciliary processes were injured; affording an additional proof of the accuracy of Beer's observations on the danger of such wounds in operations of the eye.

CHAP. XXXII.

GENERAL REMARKS ON THE CRYSTALLINE LENS AND ITS CAPSULE.

THE Crystalline Lens is enveloped in its capsule in the same manner as the aqueous humor is contained within a serous cavity. The crystalline lens cannot, however, be altogether compared to the fluids which other serous membranes exhale, though it is probable that the watery fluid, lying between the lens and capsule,* moistens these surfaces in the same manner as the pericardium or surface of the pleura, are moistened by their respective fluids. But the capsule of the crystalline

* Liquor Morgagni.

lens cannot be considered as a simple serous cavity, for the pupillar portion forms part of the cavity of the aqueous humor, and the neural portion is in a similar manner united with, and derives a covering from, the capsule of the vitreous humor.*

The Capsule of the Lens may be considered as consisting of two portions ; a pupillar portion, the exterior lamina of which forms part of the cavity of the aqueous humor ; and a neural portion, which, in a similar manner, forms part of the capsule of the vitreous humor. The neural portion of the capsule is much thinner and softer than the pupillar.

Like the capsule of the aqueous humor, the Crystalline Capsule is liable to inflammation, and to that thickening, loss of transparency, and those other changes which inflammation produces in all serous membranes. It is also, like them, some-

* These terms *neural* and *pupillar*, are used by Dr. Barclay as synonymous with posterior and anterior.

times converted into bone; and the fluid which it secretes, if the lens can be so considered, is subject to changes, some of which are probably the effects of disease in the capsule.

The pupillar and neural portions of the Capsule of the Lens will be found to undergo changes in their structure separately; the exterior lamella of the pupillar portion being frequently inflamed along with the other portions of the capsule of the aqueous humor, and the neural portion being chiefly affected in other diseases.

It is extremely probable, that the Crystalline Lens itself is organized, and that it is nourished in the same manner as other parts of the body. Albinus conceived that he had detected vessels running into it; and the changes which disease produces in its structure confirm this opinion. The lens, too, like the aqueous humor, forms part of an optical instrument; and its capsule serves the important purposes of its secretion, of its

nourishment, and of retaining it in its proper position.

The consistence of the Crystalline Lens changes at the different periods of life. In children newly born, it is extremely soft throughout; but grows firmer as they advance in years; the central portion having the greatest degree of consistence. In old age, this firmness is sometimes equal in every part of the lens.

In the same proportion as the Lens increases in density, it diminishes in size.

Zinn has remarked, that the figure of the Lens also varies at the different periods of life, being nearly spherical in the foetal eye, and becoming gradually more flat till about the age of thirty; after which its form does not appear to alter.*

Sometimes the Crystalline Lens has an unusual degree of convexity; from whence arises one kind of short-sightedness. In other instances, the lens has been found

* Zinn de Oculo Humano.

unusually flat, producing long-sightedness.* The crystalline lens is sometimes entirely wanting. It has also been found double; in which cases the pupils were also double. Its form too, sometimes varies, having been observed of a triangular shape.† Heister found it divided into different portions; and Morgagni saw a lens, part of which was wanting.

Both Lens and Capsule are of a reddish colour in the foetus, but they become transparent immediately after birth.‡ As people advance in life, the Lens generally loses its perfect transparency, becoming of a yellowish hue; and this sometimes increases to such a degree, that it acquires in old age the colour of amber.

Besides this change of colour, which may be considered as that natural decay to which the lens, like all other parts of

* See Porterfield on the Eye.

† Voigtel's Handbuch.

‡ Dr. Brewster has observed that in those animals born with shut eye-lids, there is a central opacity of the lens, which disappears when the eye-lids open.

the body, is subject, it often becomes completely opaque, forming a Cataract. The Lens is also subject to changes in its consistence, as well as in its colour, sometimes degenerating into a watery fluid, and sometimes being converted into bone. Its volume, too, may be augmented or diminished, being sometimes found small and shrivelled, and in other instances large, and of an irregular form. Disease also produces changes in the lens similar to maceration, by exhibiting the radiated appearance of its laminæ, or dividing its surface into isosceles triangles.

The crystalline fluid, or *Liquor Morgagni*, is sometimes preternaturally abundant; and its consistence and other qualities are also subject to changes from disease. Wenzel says, that he has found this humor resembling the meconium of the primæ viæ of infants.* More of this fluid has always been found in the eyes of animals long dead, than in those newly

* Manuel, de l'Oculiste, Tom. I. p. 148.

killed. Portal on examining a number of eyes of animals immediately after death, could find none of this fluid, which led him to believe “ that, like the fluids of other serous cavities, it exists no where in its natural state, but as a kind of vapour which condenses and augments from different causes.”*

The crystalline lens is also subject to injury from sharp - pointed instruments puncturing its capsule, and blows on the eye dislodging it from its natural situation.

* Portal, Anatomie Médicale, Tom. IV. p. 440.

CHAP. XXXIII.

OF CATARACT OF THE CRYSTALLINE LENS.

THE word Cataract has been used as a general name for all those diseases of the eye where an opacity is formed behind the pupil ; it is, however, employed here to signify only those diseases of the Crystalline Lens and Capsule, in which these organs lose that perfect transparency which they naturally possess. Following the nosological system hitherto adopted, of considering the diseases of each structure separately, the first class of Cataracts are here treated of with the diseases of the

lens; and the second with those of the capsule. Another class of cataracts have been denominated Secondary ; but, these being the effects of operations on the eye, will be, with more propriety, described in another place.*

When the crystalline lens becomes opaque, the opacity begins either at the central part, and extends towards the circumference, or a general obscurity pervades the whole lens from the commencement of the disease.† It has been said, that sometimes the liquor Morgagni alone becomes opaque ; but in most cases, every part of the lens is diseased. These differences have led to the distinction of two species of cataract ; the former having been called Interstitial, and the other Mixed Cataract.‡

The colour of crystalline cataracts, as

* See Treatment of Cataract.

† Glaucosis of Hippocrates — Gutta opaca of the Arabians—Suffusis—Der graue Staar, or Krystall Staar, of the Germans—Cataracta vera Crystallina.

‡ Cataracta Interstitialis et Cataracta Mixta.

they appear in the eye, is very various. Their most usual colour is a bluish white or grey ;* some are of an opaque chalky white ;† sometimes they are clouded in different parts, having the appearance of a flake of snow ; sometimes they have a greenish hue, or a slate colour, and others are of a dull yellow, or amber colour ; sometimes the opaque crystalline has a striated or radiated appearance, resembling that division of the sound lens into different segments, which is produced by chemical agents.‡ These differences, which have been observed in the colour of cataracts, have also given rise to several of those trivial distinctions which have been considered sufficient to constitute distinct species of the disease.§

Cataracts are seldom of the same colour

* See Plate XII. Fig. 3.

† See Plate XI. Fig. 1 and 2.

‡ See Plate XI. Fig. 3.

§ *Cataracta virgata fibrosa, striata, or viridis.* Cataracte Barrée.

when in the eye-ball, as after they are removed. Those lenses which appear white or grey in the eye, are generally dark yellow, or amber-coloured when extracted; and those which have a yellow hue when in the eye, often appear of a dusky white after they are removed.

The consistence of the lens also varies very much in different cases of cataract. Sometimes it retains its natural texture; sometimes it acquires a caseous,* and in other cases a gelatinous consistence; and sometimes almost the whole lens is converted into a milky fluid.† In other instances it becomes firmer and harder than natural,‡ having been found converted into a chalky matter, and also into bone.§

Like the natural, the central portion of the opaque lens is usually firmer and harder than the parts more external.

* Cataractea caseosa.

† Milchstaar—Cataracta lactea or purulenta.

‡ Cataracta crystallina solida.

§ See Ossification of the Lens.

Sometimes the consistence of the crystalline cataract is not the same in both eyes of the same person.

It is of much practical importance to be able to distinguish, in the living eye, these differences in the consistence of the diseased lens; for, according as the cataract is hard or soft, so ought the treatment to be varied. An accurate knowledge of these differences can only be acquired by experience, and habits of attentive discrimination; for there are scarcely any diagnostic marks of a soft and hard cataract which can be altogether depended on. The soft cataract may, however, be in general distinguished, from the large size of the opaque body, its near approach towards the plane of the iris, or edge of the pupil, its white colour, and from having points, streaks, or inequalities, which vary their appearances at different times. The blindness, too, by which soft cataracts is accompanied, is always considerable; for when the whole lens is opaque, the patient can

derive no benefit from the great dilatation of the pupil, which is produced by shading the eyes, or by the influence of belladonna, and can seldom see more than differences in the intensity of light.

When the cataract is hard, the opaque body is neither so large nor so close to the edge of the pupil as when it is soft, so that a sufficient number of rays of light can enter, and the patient is still capable of distinguishing some objects from the side of the eye. The hard cataract has the same shade of colour throughout the whole lens, and its natural smooth surface may be remarked; the motions of the pupil are extremely lively, and it seldom remains much enlarged.* The opacity behind the pupil is, at the commencement of the disease, observed in the middle, and then extends, very slowly, towards the circumference of the lens. The colour of the hard cataract is usually grey, passing more or less to a bluish hue.

* Beer's *Lehre der Augenkrankheiten*.

It has generally been remarked, that the fluid, or milky cataract, is the most frequent form of the disease in children, and that the solid or concrete cataract is most common in the adult. Soft cataracts, however, are by no means unusually met with in those advanced in life; and I have, in a few instances, also known the lenses of young people converted into a chalky matter, and into bone.

Symptoms.—In cases of simple opacity of the lens the Pupil continues to contract and dilate, according as the quantity of light to which it is exposed be increased or diminished; and the retina continues to retain its sensibility, though its functions become necessarily limited. When the opacity is confined to the central part of the lens, the vision is little impaired, and in some people, who have naturally a large pupil, although a very considerable portion of the lens becomes opaque, yet the sight of the eye continues good. If the opacity of the lens is more general, objects appear to

the patient, from the commencement of the disease, as if seen through a mist or smoke ; and in proportion as the opacity increases, vision becomes more obscure, till even the largest objects cannot be distinguished, and the patient can merely perceive a difference in the quantity of light, and in bright colours. An eye affected with cataract never becomes perfectly blind, for the lens does not acquire, even in the most advanced state of the disease, that degree of obscurity which prevents all rays of light passing to the retina.

In most cases, the patient with cataract can distinguish objects better in a dull, than in a bright light. This arises from the pupil being more dilated in a moderate light, and admitting rays to pass through the edge of the lens which still remains transparent. For the same reason, a person with cataract sees most distinctly when he shades his eyes, and exposes the object to a bright light ; and it is also on the same principle that the belladonna, by

producing an unnatural dilatation of the pupil, gives a temporary relief, even in those cases of cataract where nearly the whole lens has become opaque.

When the exterior edge of the lens is less obscure than its centre, the patient then sees objects more distinctly which are placed by his side, than when held opposite to him. If, however, the obscurity has not affected the middle of the lens, but some parts of its circumference, any circular body then appears to have its edge imperfect. Near objects can be more distinctly seen than those which are more remote ; and thus a person affected with cataract appears short-sighted.

The loss of vision from cataract is seldom uniformly progressive ; for, sometimes after remaining a while stationary, it becomes suddenly more imperfect ; and, by a succession of rapid alterations, the sight is ultimately destroyed.

The progress of cataract is very different in different examples of the disease.

Sometimes it proceeds so slowly as not to destroy vision for many years ; at other times a complete obscurity of the lens takes place very rapidly. Several instances have come within my own observation, where a patient has, in a few hours, become quite blind with this disease. Richter and Eschenbach relate cases where people labouring under gout, which suddenly retroceded, were entirely deprived of their sight in one night, from the formation of cataracts. Beer saw a woman, who incautiously holding a bottle of muriatic acid to the eye, had a cataract formed immediately ; which he saw ten days after, and extracted.

Cataract of the lens commonly affects only one eye, and after the disease has advanced to a greater or less degree, then the other eye is attacked. In other cases, both eyes are simultaneously affected. I have generally observed, that when cataract takes place in young people, and affects only one eye, the other eye continues,

during life, free from disease. This is also the case in those cataracts which arise from an injury, particularly when no affection of the sound eye takes place soon afterwards. Richter mentions the case of a man who received a wound of the eye, which was followed by a cataract, and soon afterwards a cataract formed in the other eye. A similar sympathy has been observed with regard to the iris,* and it may be remarked in all the corresponding structures of these organs.

When there is a Cataract in both eyes, the disease is not always of the same kind in each. Sometimes the lens is affected in one eye, and in the other the capsule is opaque; sometimes both the capsule and lens are opaque in one eye, whilst in the other there is only a crystalline cataract; and sometimes one eye is affected with cataract, whilst the vision of the other is destroyed by amaurosis.

Both sexes are equally subject to cata-

* See Chap. XX. page 36.

ract, and no age is exempt from the disease ; but it is more common in infants, and those advanced in years, than at the middle period of life.

In most cases, the crystalline cataract appears to be merely a *local* disease, though, in many instances, an opacity of the lens accompanies or succeeds other diseases of the eye. Cataract is frequently observed in gouty and rheumatic persons ; and in such, there is generally reason to suspect that the opacity of the lens is more or less connected with the constitutional affection.

Hereditary Cataract.—In some cases, cataract appears to be Hereditary.* Many examples of hereditary cataract are recorded by different authors, and a considerable number have fallen under my own observation. I have several times known brothers and sisters, and in one instance, twins, affected with cataract. I have also known a father, son, and grandfather,

* Cataracta hereditaria.

affected with it. Richter extracted a cataract from a man, whose father and grandfather were both blind from that complaint.* Maitre-Jean and Janin have both met with similar cases. Richter also saw three children born of the same parents, all of whom had cataracts at three years of age; and Janin saw a family of six persons blind from this disease.

In some cases, where the cataract is Hereditary, the opacity is confined to the lens; in others, both the lens and capsule are opaque. The hereditary disposition is observed both in the infant and adult, and is equally common in both sexes. The same kind of cataract generally prevails in the same family, when different branches are afflicted with the disease.

Congenital Cataract.—In some instances, cataract is Congenital. It is by no means unusual to see infants born with cataracts; and these consist either of opacity of the crystalline lens, or of its

* Observations on the Cataract.

capsule;* or both are at the same time affected.

In the Congenite Crystalline Cataract, the whole lens is either found converted into a milky fluid, or soft substance, or into a structure firmer than natural, which is generally confined to the central part of the lens, leaving the edges quite transparent.† In the latter case, the opaque portion is generally of a chalk-white colour, there is usually a distinct line of demarcation between the opaque and transparent portions, and the shape of the opacity is irregular. In those cases where I have had an opportunity of examining lenses thus diseased, the opaque part was found to consist of a substance exactly resembling moistened chalk in colour and consistence. In other instances, where the disease affected the central part of the lens alone, the opaque portion was of a pale grey colour.

* See Capsular Congenite Cataract.

† See Plate XIII. Fig. 1 and 2.

The Congenite Crystalline Cataract commonly affects both eyes ; but sometimes only the crystalline of one eye, whilst in the other, the capsule of the lens is opaque ; and sometimes both the capsule and crystalline of one eye are opaque, and in the other only one of these is affected. The disease is never observed to make any progress after birth, neither does it suffer any amendment unless in some cases, where, from an accidental blow or injury, the capsule of the lens is lacerated, and then the lens undergoes a gradual process of solution, leaving behind the opaque capsule.*

In some cases, the Congenital Cataract is dissolved with great rapidity, and in two cases I have observed it nearly altogether disappear even in a few minutes after being mixed with the aqueous humor.

Vision varies in this species of cataract, as in the Centicular, the patient being sometimes able to distinguish only different

* See Scarpa, *Traité de Maladies de l'Oeil*.

degrees of light, whilst others see with considerable distinctness.

In some cases of Congenite cataract, the eye-ball has a peculiar involuntary rolling or goggling motion, and sometimes the cataract itself has, at the same time, a tremulous motion.*

Cataract of the lens is not unfrequently combined with other diseases. It is by no means unusual for a cataract to affect an eye that has previously been amaurotic. In most cases, where Amaurosis accompanies this disease, there is a preternatural dilatation and immobility of the pupil, and the opaque lens appears behind it of a large size, and generally of an equal shade of opacity.† In some cases, where these two diseases are combined, the pupil remains of its natural size, and continues to be influenced by light; but the presence of disease in the nerve is always pointed out by the loss of vision being

* Cataracte Branlante of the French. See Chap. XXIII.

† See Plate XIV. Fig. 2.

antecedent to the opacity of the lens, by the blindness being to a greater degree than would take place in simple cataract, and by sparks of fire, and spots appearing before the eyes, pains of the brow and head, with other symptoms of a diseased retina.

Cataract of the lens is often accompanied with opacities, both of the cornea and crystalline capsule ; and there are also many derangements of the eye, where, along with other diseased changes, the lens becomes opaque.

The changes which take place in the structure of the crystalline lens, and the various appearances which it assumes in cataract, have not been well explained. The dimness and amber hue which have been mentioned* as common in those advanced in life, probably arise from a want of that balance in the secreting and absorbent systems, which is necessary to preserve the different parts of the body

* See Chap. XXXII. page 77.

perfect and entire ; and an unusual degree of that decay may, in some cases, produce a complete cataract. In those cases of cataract, which are the immediate result of a wound or injury of the lens, it is not improbable that the obscurity is produced in the same manner as a piece of glass or transparent crystal becomes opaque when it is struck or bruised ; and a cataract of this description may be imitated by penetrating the lens with a needle, after it has been removed from the eye. Whatever, too, is capable of causing a coagulation of the albumen or gelatine, of which the sound lens is composed, will destroy its transparency, a change probably produced whenever, from any cause, its organization is destroyed, or when it comes in contact with the aqueous humor. An opacity of the lens may also be produced by Inflammation. Walther* has given a minute description of inflammation of the lens ;

* Abhandlungen aus dem Gebiete der Practischen Medicin, &c. von P. F. Walther, Landshut, 1810.

and it is by no means improbable that the lens, like other parts of the body, is liable to inflammation, and that, like all transparent parts, it becomes opaque when inflamed.

CHAP. XXXIV.

OF OSSIFICATION OF THE CRYSTALLINE LENS.

IT is not unusual to meet with cases where the crystalline lens has been supposed to have been converted into Bone ; but in all those which I have had an opportunity of examining, excepting in one instance,* the lens itself was found inclosed in an osseous shell, which, in all probability, was the capsule of the lens ossified. In this case, the eye had been preserved for some time in spirits, and was sent to me for dissection by the late Mr. Allan Burns of Glasgow, a man no less remark-

* See Ossification of the Capsule of the Lens.

able for his eagerness and liberality in diffusing knowledge, than for his industrious professional zeal. On removing the sclerotic, a greyish spot was observed on the choroid coat. On dissecting back the choroid coat, the pupillar portion of the posterior chamber was filled with a white pulpy mass; and, on dividing the crystalline lens, its central portion was found converted into hard bone.* The external laminae of the lens were soft, but those nearer the centre were more consolidated, the central portion itself being of a deep brown colour, perfectly osseous, and exhibiting a laminated structure.

It has already been noticed,† that the crystalline lens has been found converted into a substance resembling moistened chalk in colour and consistence.‡

* See Plate XV. Fig. 5.

† See Chap. XXXIII. and Plate XXV. Fig. 1 and 2.

CHAP. XXXV.

OF WOUNDS AND DISPLACEMENTS OF THE LENS.

THE lens sometimes becomes obscure, both from blows on the eye-ball, and from sharp-pointed instruments penetrating the capsule.

When a blow produces an obscurity of the lens, the change will generally be found to arise from the capsule having burst, and the lens thus exposed to the action of the aqueous humor. A diminution of transparency of the lens may also be produced by the mechanical changes occasioned by the puncture of a hard body on a substance possessing the tenacity and

transparency of the lens. Mr. George Young saw several soldiers, who in order to procure a pension, had produced a cataract, by introducing a needle through the cornea and pupil, so as to wound the lens and capsule.

When the lens is wounded by an instrument penetrating the anterior chamber, generally more or less of the lens escapes, through the wound of the capsule, forming an opaque cloud, which passes through the pupil, and extends into the anterior chamber.* In some accidents of this kind, I have seen the whole opaque crystalline pass, by degrees, through the wound of the capsule, into the anterior chamber, and be gradually and completely dissolved. This process has been imitated with great success in order to produce the solution of some kinds of cataract.

In some cases, cataracts arising from an injury of the lens, remain unaltered during life ; but, in those instances the

* See Plate XI. Fig. 1.

wound of the capsule had healed ; and thus no communication was formed between the anterior chamber and cavity of the capsule of the lens. It sometimes happens, that, in consequence of a blow on the eye, the crystalline lens is thrown out of its capsule, and passes through the pupil into the anterior chamber, in which case, it always becomes rapidly opaque.*

In most cases where the lens is “luxated” from disease of the internal parts of the eye-ball, it comes forwards into the anterior chamber inclosed in its capsule,† and when in this situation, no solution or absorption takes place.

* See *Maladies de l’Oeil*, par Maitre-Jean, p. 271.

† See *Cataract of the Capsule of the Lens*.—*Cat. Luxata*.

CHAP. XXXVI.

OF INFLAMMATION OF THE CAPSULE OF THE LENS.

IT has already been noticed, that the Capsule of the Lens is composed of two portions, which, in some respects, differ in structure ; the neural portion being much thinner, softer, and weaker than the pupillar.* From what I have been able to observe, it appears extremely probable, that, not only each portion, but that each lamina of the two portions may be separately diseased ; in the same manner as was mentioned, when treating of the diseases of the choroid coat, a membrane

* See Chap. XXXII.

having also two distinct serous surfaces; each of which is subject to diseased changes, unconnected and distinct from one another.*

Inflammation affects either the pupillar or the neural portion of the Capsule of the lens, or it affects the whole interior lamina of the capsule at the same time.

It has already been observed, that, when Inflammation has extended over the capsule of the aqueous humor, that portion which forms the exterior lamina of the pupillar portion of the capsule of the crystalline lens also participates in the disease.† The affection of this portion of the capsule is distinguished by the effusion of albumen on its surface obliterating the pupil, and rendering it irregular, contracted, and unchangeable; and by adhesions taking place between the edges of the iris and the effused albumen. These changes may sometimes be observed when the iris and adjacent

* See Chap. XXIX.

† See Chap. XVI.

parts are little affected. At other times, albumen is effused over the whole surface of the iris, and anterior chamber.*

The adhesions formed between the iris and Capsule of the lens are, in some instances, very partial, being easily destroyed by the application of *Belladonna* to the eye; but, in others, they are firmer, and extend round the whole edge of the pupil, a partition being thus formed between the two parts of the anterior chamber. Hence the iris is pressed forwards towards the cornea, from the aqueous humor not having a free communication through the opening of the pupil.

When the Capsule of the Lens is extracted in this state, it will be found to have sometimes acquired a most extraordinary degree of thickness and toughness; but these changes are alone confined to the pupillar portion, the neural portion of the capsule retaining its natural pellucidity.†

* See Chap. XVI.

† See Plate XV. Fig. 4.

It is this state of the eye that has been described by Mr. Wathen as a species of spurious cataract, and called by him the “*Adventitious*” cataract.*

Inflammation of the neural portion of the capsule, and of the proper capsule of the lens, can only be known from its effects in destroying the transparency and delicate structure of these parts.

When the Capsule of the Lens is wounded, the whole interior lamina usually becomes opaque; but the exterior lamina of the pupillar portion seldom becomes affected. This is known from there being no appearances of albuminous deposition in the pupil or on the iris;—no adhesions of the iris to the capsule;—whilst the colour of the opaque capsule, instead of having the buffy hue produced by albumen, appears like an opaque white and thin floating membrane.

Inflammation and opacity of the neural portion of the capsule are only to be

* See Wathen on Cataract, page 143.

distinguished, as far as I have been able to observe, in “*Secondary*” cataract,* or in that variety of cataract which succeeds the removal of the lens by an operation.

* See Plate XV. Fig. 5.

CHAP. XXXVII.

OF CATARACT OF THE CAPSULE OF THE LENS.*

FROM the general observations which have already been made on the structure and functions of the Capsule of the Lens,† it may readily be perceived how it should frequently be the seat of opacities. Indeed there is, perhaps, no disease of that membrane which is not either accompanied or followed by a diminution in its transparency. These opacities, of which there are

* Cataracta capsularis vel membranacea. Der Kapselstaar.

† See Chap. XXXII.

several varieties, have been, by most authors denominated Capsular Cataracts.

Sometimes the whole capsule of the lens becomes opaque ; and, in other instances, the opacity is confined to one portion of it. This is either the pupillar or neural portion ; and the former of these, which, in its natural state, is much thicker than the other, sometimes exhibits a still greater inequality when diseased. That the two portions of this capsule should present different diseased appearances, may have been suspected from the difference in their connections, for the pupillar portion being covered by a portion of the reflected capsule of the aqueous humor, naturally participates in its diseases, whilst the neural portion is, in a similar manner, connected with the capsule of the vitreous humor.*

The appearances of Capsular Cataracts are very various. Some of them are of a pearl white colour, and glistening;† others

* See Plate XIII. Fig. 1.

† See Plate XV.

are of a dull, milky whiteness ;—others are mottled with small white spots upon a more opaque ground,* —or they have a reticulated appearance. Sometimes they have large white spots, and sometimes they appear like a delicate white web or flake of snow.† Their texture, too, is very various, being sometimes soft, and very pulpy ; sometimes brittle, and easily ruptured ; and sometimes very tough and elastic. In two or three instances, this membrane has been found in adults of considerable thickness, very much resembling cornea when long immersed in water.‡

I have observed several examples of capsular cataract where the opacity was confined to the central portion of the cap-

* Plate XV. Fig. 2.

† See Practical Observations on the Formation of an Artificial Pupil in several deranged States of the Eye. To which are annexed, Remarks on the Extraction of Soft Cataracts, and those of the Membranous kind, through a Puncture in the Cornea. By Benjamin Gibson, Surgeon to the Manchester Infirmary, &c. &c. London, 1811.

‡ Ibid.

sule, an opaque white point appearing in the centre of the pupil, with several shades or degrees of opacity around it, forming circles, so that the diseased capsule resembled the section of a calculous concretion composed of concentric laminæ.* When a cataract of this kind is extracted, the pupillar portion of the capsule is found very much thickened, whilst the lens is sometimes quite transparent.

Though the neural portion of the capsule of the lens cannot be separated by dissection from the vitreous humor, the connection between these two capsules is sometimes completely destroyed by disease; and the lens inclosed in its capsule can be easily separated,† or is altogether detached, and allowed to float in the cavity of the aqueous humor, passing and repassing through the pupil, according to the position of the head.‡ In almost all

* See Plate XIV. Fig. 4.

† Cataracta cystica,—elastica. Balgstaar.

‡ Cataracta luxata.

the cases of this kind which I have had an opportunity of examining, the capsule of the lens had become detached only after a considerable change had taken place in the structure of the parts contained in the posterior chamber; the vitreous humor being changed in colour and consistence, and the functions of the retina destroyed.

In most cases, where the lens is found in the anterior chamber, it is extremely probable that it remains inclosed in its capsule, otherwise it would be dissolved by the action of the aqueous humor.

In some cases of cataract, where the lens, as well as the capsule, is opaque, and where the iris has an undulatory motion, the cataract is also moveable, the motion appearing to be communicated to it from adhesions between the capsule and iris.* In some cases this variety of cataract is accompanied with a change in the structure of the vitreous humor and its cap-

* *Cataracta tremulans*. — *Cataracte branlante* — *Zitterstaar*.

sule, the humor losing its natural transparency and consistence, and the connection between the capsule and the ciliary processes being more or less destroyed. This disorganization of the eye is generally the consequence of violent inflammation, and is always attended with total blindness.

Most frequently the capsular cataract is Congenital. Though it is generally accompanied by an opacity of the crystalline lens, yet in many cases the capsule is found alone in the eye, the lens having been dissolved.* This change in the congenital cataract is not unfrequent; for, in some cases, the capsule, without any evident cause, gives way, and allows the lens, which is usually in children degenerated into a milky fluid, to pass through the pupil, and mix with the aqueous humor, where it is dissolved. In other cases, this change is the effect of a blow on the eye. Mr. Gibson gives an account of a child born blind, who received a blow on the eye,

* *Cataracta membranacea primitiva* of Scarpa.

which was immediately followed “ by a muddy white appearance, so as entirely to obscure the iris. On examining the other eye, I found a cataract, which, from its appearances, and being congenital, I concluded was of a milky kind. On inspecting the eye two or three days afterwards, a rent could be seen in the capsule, where the fluid had been discharged.” * In several instances of congenital cataract, where, from the appearances of the eye, there was reason to suspect the lens was dissolved, the parents of the child have been able to recollect a period when a particular change took place in the cataract; a change produced by the escape of part of the soft lens into the anterior chamber. In some cases, the whole lens is, in this manner, dissolved, except a very small portion, which is usually what was the central portion; that being naturally the hardest.

* Practical Observations by Benjamin Gibson, Manchester, 1812.

When the lens undergoes this natural process of solution, the pupillar portion of the capsule comes in contact with the neural, so that there appears only one membrane, more or less opaque, at some distance from the plane of the iris.

In one instance, I observed a child, with Congenite cataracts, the appearances of which were very remarkable. A substance of a regular *Pyramidal* form, and of an opaque white colour, occupied two thirds of the pupil of each eye. The base of the pyramid rested on the capsule of the crystalline lens, and the apex passed through the pupillar opening, advancing forwards till it came apparently in contact with the transparent cornea. The rest of the pupil was quite transparent, the iris had its natural motions; and the child appeared to see so well, that no operation, in order to remove the opaque bodies, was thought advisable.*

A case, in many respects similar to that

* See Plate XIV. Fig. 6.

now mentioned, is narrated by M. Wenzel. “ The capsules of both eyes of a girl born blind were very opaque, and each formed a Pyramid, which projected through the pupil, and extended as far as the cornea, but did not touch it.” *

* See Manuel de l’Oculiste, par M. Wenzel. Paris, 1808.

CHAP. XXXVIII.

OF OSSIFICATION OF THE CAPSULE OF THE LENS.

IT has already been observed, that Ossification is a diseased change to which all serous membranes are subject. It takes place in the pia mater, in the pleura, in the peritoneum, and in the vaginal coat. I have found the capsule of the aqueous humor converted into bone; and also several examples of complete ossification of the Capsule of the Crystalline Lens. But the Capsule of the lens, like other serous membranes, acquires all degrees of hardening, from simple thickening to

cartilaginous conversion. When the Capsule of the crystalline lens becomes ossified, the Ossification generally takes place in its pupillar portion, and in some cases the whole capsule is converted into a shell of bone. The ossification commonly retains the natural form of the capsule, and contains the lens, the transparency of which is generally destroyed.* In some cases, where the capsule is ossified, the lens itself has been previously dissolved or diminished in bulk, so that the ossification is of a more irregular form ; the capsule having been shrivelled previous to its conversion into bone. The ossified capsule is sometimes extremely thin and brittle ;† in other cases, the ossification is thicker, and its texture firmer.‡

Ossification of the capsule of the lens is usually met with in people advanced in life. It is a change of structure which

* See Chap. XXXII.

† See Plate XIII. fig. 6.

‡ See Plate XVI. fig. 1 and 2.

always takes place very slowly, and is usually accompanied with diseased changes in other parts of the eye. I have met with it in eyes where there was also ossification of the choroid coat ;—in eyes where the hyaloid membrane was converted into bone ;—in some cases of fungus hæmatodes,— and in staphyloma.*

Examples of Ossification, where the diseased change seems to have taken place in the capsule, and not in the lens itself, as has been supposed, are mentioned by different authors. Morgagni met with a case where “ there was nothing in the eye which could have been certainly known to be the crystalline or vitreous humor, but only a few drops of turbid and brown water. Not far, however, from the natural situation of the lens, I found a hard little body, in the size and form of its circumference, not much differing from the crystalline, but a little larger and convex on its anterior

* I have frequently found ossification of the capsule of the lens in diseased eyes of Horses.

surface; and on its posterior, it was concave, so that it represented a little shield.”*

Morand,† Janin,‡ and others, mention cases, in all of which the ossification appeared to have taken place in the capsule, and not in the lens itself. Mr. Gibson has also related a case where the capsule of the lens was partially ossified. “ It felt gritty to the couching needle, and produced a noise as if the instrument passed over a piece of dry parchment.” §

* Epist. xiii. Art 10.

† Mémoires de l’Acad. R. anno 1730.

‡ Traité de Maladies de l’Oeil, page 228.

§ See Practical Observations, &c. page 121, by Benjamin Gibson, Manchester, 1812.

CHAP. XXXIX.

GENERAL REMARKS ON THE VITREOUS HUMOR AND ITS CAPSULE.

THE capsule of the vitreous humor, or Hyaloid Membrane, is a serous cavity, and may justly be compared to the capsules of the aqueous humor and crystalline lens, from its structure, functions, and diseases.

The Hyaloid Membrane, in the adult, has the most perfect pellucidity, and is so extremely thin, that, in the natural state, it is scarcely visible. In the foetus it is tinged of a rosy colour.*

The anterior portion of the Hyaloid

* Angely.

Membrane has been described as composed of two laminæ;* the one uniting with the pupillar portion of the capsule of the lens, and the other forming the neural portion of that capsule. After these two laminæ separate, they again unite, a cavity being thus formed, called the canal of Petit, which has no communication with any of the contiguous cavities, and the functions of which are not understood; nor has it ever been observed to have any share in diseases.

The interior surface of the hyaloid membrane does not altogether resemble the capsules of the other humors, for, instead of consisting of a simple cavity, numerous prolongations pass from it, which form cells communicating with one another, and in which is contained a fluid perfectly transparent, in many respects resembling the aqueous humor. This cellular structure is probably intended for giving the vitreous humor a consistence, elasticity, and form;

* See Chap. XXXII.

to keep the lens in its proper situation, and to permit of a certain degree of motion. It may also assist in preserving the shape of the eyeball, when its cavity is penetrated.

Like the aqueous humor, it is somewhat thicker, heavier, and more viscid than water, and, though it may appear to have more consistence, this deception arises from the globules being contained in small cells communicating with each other, so that, when one is torn, the contents of those contiguous are but slowly discharged.

The chemical qualities of the vitreous humor are nearly the same as those of the aqueous humor, and its refracting power is also similar.

The vitreous humor is penetrated by an artery which arises from the central artery of the retina, and passes through its middle in a serpentine direction, giving off branches which communicate with one another; whilst the principal trunk terminates in the capsule of the lens.

Though the vitreous humor resembles, in many respects, the aqueous, it does not seem to possess the same solvent powers. This is strikingly illustrated by comparing the difference in the rapidity by which crystalline and capsular cataracts are dissolved when in contact with these humors.

It is extremely probable that the fluid contained within the cells of the hyaloid membrane, is exhaled from the arteries in the same manner as the aqueous humor and fluid of the crystalline lens are exhaled from the vessels of their respective capsules.

The capsule of the vitreous humor is subject to morbid changes similar to those of other serous membranes, and the fluid itself is sometimes altered in its quantity, colour, and other qualities.

The vitreous humor does not lose its pellucidity like the crystalline lens, but retains, even in advanced age, a perfect transparency.

When a part of the vitreous humor is

evacuated, it is replaced by an aqueous fluid, which seems to answer all the purposes of vision. This regeneration takes place even when the quantity discharged has been very considerable ; and, in experiments on animals, the whole has been taken out, and replaced by a watery fluid, the sight being perfectly restored.

CHAP. XL.

OF THE DISEASES OF THE VITREOUS HUMOR AND ITS CAPSULE.

THE Diseases of the Vitreous Humor and its capsule, like those of the aqueous humor, are few, occur seldom, and generally accompany other diseases.

The vitreous humor is sometimes perceived to be much thinner in its consistence than natural.* When this takes place, the hyaloid membrane, with its various prolongations, are absorbed, so that the bulb of the eye resembles one bag filled with water ; the sclerotic coat yielding to the

* Synchysis, Dissolutio humoris vitrei, Atraphie de l'Oeil.

slightest touch, and the cornea losing its convexity. This sometimes happens in eyes which have suffered from severe internal inflammation, and it is always accompanied by other diseased changes.

A portion of the vitreous humor generally degenerates into a watery fluid after the use of the couching needle. On puncturing the cornea to remove an opaque capsule from a boy's eye, the posterior chamber of which had twice been punctured by the needle, the eye nearly altogether sunk, from the whole vitreous humor being converted into an aqueous fluid ; but it was completely regenerated.

Morgagni dissected an eye, " which was smaller than natural, and the pupil appeared white. Having cut into the back part of the sclerotica, a quantity of limpid water flowed out, into which water a great part of the vitreous humor seemed to have degenerated, the remaining part appearing natural." *

* Epist. lviii. Art. 16.

The vitreous humor also becomes, in some instances, thicker than natural. Morgagni mentions having dissected the eyes of a man whose vision had been very imperfect for some time previous to his death, “in one of which the vitreous humor adhered to the finger, and formed itself into long threads, following the fingers as they were drawn asunder. This was not the case with the vitreous humor of the other eye, but in both eyes the lens was diseased.” *

The vitreous humor is sometimes more or less diminished in quantity. An absorption of it sometimes takes place after the eye has suffered from violent attacks of inflammation, more particularly when the inflammation has affected the choroid coat and iris. In dropsy of the choroid coat,† the vitreous humor is absorbed in proportion as the morbid accumulation of water takes place between the choroid coat and

* Epist. xiii. Art. 15.

† See Dropsy of the Choroid Coat, Chap. XXIX.

retina ; and, in those cases where the retina was found so compressed as to form a cone, no remains of vitreous humor could be observed *

In some instances there is an increase in the quantity of the vitreous humor. This happens not unfrequently in staphyloma ; for, in this disease, the increase in the bulk of the eyeball will generally be found to arise more from an increase in the quantity of the vitreous, than aqueous humor. An increase in the quantity of the vitreous or aqueous humor has generally been treated of as a distinct disease, and denominated *Hydrophthalmia* ; but I have never seen a dropsy of the eye without an accompanying disease of the sclerotic coat or cornea ; and it seems to me that it is an example of staphyloma which Scarpa has described, in order to illustrate the pathology of *Hydrophthalmia*.†

* See Maitre-Jan, p. 241.

† Treatise on the Diseases of the Eye.

A change is sometimes to be observed in the colour of the vitreous humor. Morgagni* saw it converted into a few drops of turbid brown water ; and Scarpa found in its place “ a few drops of a glutinous, bloody water.”

In the living eye, the colour of the posterior chamber sometimes appears changed ; but it is difficult to discriminate, in many instances, whether this change of colour arises from a change in the colour of the vitreous humor, or from some coloured body shining behind it. In the commencement of fungus hæmatodes, the buff-coloured substance formed at the bottom of the eye produces an appearance as if the colour of the vitreous humor was changed ; and I have remarked a similar appearance from the effusion of albumen in the posterior chamber.

In some cases the vitreous humor acquires a dull greenish colour, accompanied

* Letter xiii. 9.

with insensibility of the retina, a species of amaurosis which has generally been called *Glaucoma*.*

The capsule of the vitreous humor, like that of the aqueous humor and crystalline lens, sometimes becomes opaque.† Maitre-Jan saw it in the eye of a horse, like a beautiful net-work. I have observed the same appearance in a few instances, where the lens had been imprudently extracted, and where violent inflammation followed the operation.‡

The capsule of the vitreous humor is sometimes found Ossified. In one case, besides the capsule of the lens being ossified, I found several large, but thin, scales of bony matter, dispersed in an irregular manner throughout the vitreous humor, which, in all probability, were ossifications of the hyaloid membrane.§ A prepara-

* See Amaurosis. Chap. XL.

† Cataracta Hyaloidea.

‡ Cataracta secundaria Arachnoidea.

§ See Plate XVI. fig. 2.

tion of the same kind is in Dr. Baillie's collection.

On examining an eye, the natural form of which was destroyed, the cornea having become quite opaque, and the anterior chamber almost entirely obliterated, I found, on dissecting back the sclerotic coat, the posterior chamber occupied by a hard irregular-shaped mass, with the choroid coat and iris adhering to it. On removing the choroid coat, no remains of the retina could be detected. The bony mass was composed of two distinct portions, slightly connected with one another.* One portion was in the situation of the crystalline lens, exactly resembled it in form, and being composed of a thin hollow shell of bone, appeared to be the capsule of the lens ossified.† The other portion occupied the site of the vitreous humor; and, from the inequality of its surface, being

* See Plate XVI. fig. 1.

† See Ossification of the Capsule of the Lens, Chap. XXXVIII.

composed of numerous osseous laminae irregularly disposed, I conceived it to be portions of the hyaloid membrane ossified. A similar case is related by Morgagni, and another by Scarpa.

CHAP. XLI.

GENERAL REMARKS ON THE OPTIC NERVES AND RETINA.

THE structure of the different Nerves is various, being, in this respect, unlike the arteries and veins, which throughout the system are the same, whatever be their size, their course, or functions. Thus, the nerves of the organs of sense have a structure calculated to receive impressions of external objects, according to the particular office which each organ performs. The auditory nerve is distributed in a fluid, which is agitated by every undulation of the external air; the olfactory nerves, and nerves of touch, are spread underneath

a delicate skin ; the gustatory nerves terminate in numerous papillæ ; whilst the retina is expanded around a transparent and refracting cavity, to receive the impressions of the rays of light.

The Optic Nerves are remarkable for being the only nerves, besides the olfactory, which arise from the cerebrum ; and which, except the auditory and olfactory, pass to the organ they are intended to supply, without forming any communication with other nerves.

The optic nerves are larger, and the medullary matter is in much greater proportion in them than in any of the other nerves.

The optic nerves are also softer than any of the nerves within the cranium. Between their origin and place of union, they are as pulpy as the medullary substance from which they emanate, but their consistence is a little increased from their union to the optic foramina.*

* Bichât, Anat. Des. Tom. III. p. 155.

Until the Optic Nerves unite, they derive no covering from the pia mater ; but at the place of their union, canals are formed by this membrane, which are filled with pulp, and which are prolonged to the retina. When they pass through the optic foramina, they receive an additional tunic ; the dura mater dividing at this place into two laminæ, one of these uniting with the periosteum, which lines the orbit, whilst the other forms a very dense and strong *neurilema*, which envelops the nerve as far as the sclerotic coat. The pia mater, which forms the canals in which the pulp is contained, passes within the globe, forming the vascular lamina of the retina. Hence the sympathies observed in the diseases of these parts, from the connection of the coverings of the optic nerves. How often does pain in the head and in the different sinuses accompany affections of the eyes ; and morbid feelings in the eyes, diseases of the membranes of the brain ?

The optic nerves, besides being remarkable for having their origin in the cerebrum,—for containing a greater quantity of medullary matter than other nerves,—for having no anastomoses,—from being enveloped in one general covering, instead of being composed of bundles of filaments,—are also singular in their structure, from having an artery* passing through their axis, in place of being supplied from the surrounding vascular trunks.†

The Optic Nerves, at the place of their union in the sella turcica, were long believed to cross each other; that going to the left eye, being supposed to come from the right thalamus; and that from the left thalamus, to go to the right eye. Vesalius, Aquapendente, and others, had observed that the optic nerves in some instances, remained separate from one another during their whole course; and the man in whom Vesalius saw this formation had strong

* *Arteria centralis retinae.*

† Bichât, Anat. Gen. Tom. III. p. 154.

vision. The same thing was observed in animals;* and it was also found, that, in dissecting diseased eyes, the disease always extended along the side corresponding with the affected eye.† But, though the optic nerves do not seem to cross each other, there is little doubt of an intermixture of some of their medullary fibres ; for it is much more probable that the remarkable sympathy existing between the two eyes rather arises from this intermixture of the medullary fibres at the union of the nerves in the sella turcica, than from any intermixture of other nerves in the brain.‡

The Retina.—The Retina is composed of two laminæ which present distinct structures. The one which is vascular is in contact with the capsule of the vitreous humor ; and the other which is medullary is contiguous to the choroid coat.

* See Briggs's Ophthalmographia. Lugd. Batavor. 1686.

† See Diseases of the Optic Nerve, Chap. XLIV.

‡ Anatomie Medicale, par A. Portal.

The first of these laminæ is a very delicate membrane, of a fine cellular structure; adhering slightly to the capsule of the vitreous humor. Injections shew that it is very vascular; and it is supplied with nerves from the ophthalmic ganglion, in like manner as the *neurilema* of the optic nerve is supplied with branches from the same ganglion. The other lamina of the retina, which seems to be entirely composed of medullary matter, is so intermingled with the vascular membrane, that the two have never been distinctly separated.

There is a part of the retina called the *Macula Lutea*, discovered by Sömmering, which has hitherto been observed only in the human eye, and the functions of which have not been even conjectured.* The macula lutea, which is found near the centre of the retina, appears as a yellow spot, contiguous to which is a fold and a small hole. From the observations of

* See *Icones Oculi Humani*.

Michaelis, it is extremely probable that this part of the retina has an important share in some diseases. In eyes which had become opaque, the spot could not be detected ; in a Staphylomatous eye it was scarcely visible ;—in an Amaurotic eye this spot was black ;*—and Beer has observed it changed in Glaucoma.

Membrana Jacobi.—But besides these two laminæ of which the retina has usually been supposed to be formed, there is a membrane lately described by Dr. Jacob, of Dublin, which seems to belong to the retina. This membrane is found between the choroid coat and medullary lamina.† “ It covers the retina from the Optic Nerve to the ciliary processes. In the foetus of nine months it is exceedingly delicate and with difficulty displayed. In

* Mémoires de la Société Médicale d’Emulation, anno 1798.

† An Account of a Membrane of the Eye, now first described by Arthur Jacob, &c. &c. Phil. Trans. for 1819, Part II.

youth it is transparent, and slightly tinged by the black pigment. In the adult it is firmer and more deeply stained by the pigment which sometimes adheres to it so closely as to colour it as deeply as the choroid coat itself. In a young subject it was found partially separated from the retina by an effused fluid." It is not improbable that pathological researches will prove that its functions are analogous to those of the pia mater.

Diseases.—In most diseases of nerves, there is merely an alteration in their sensibility ; seldom can any change be detected in their structure. And as the natural structure of the optic nerves and retina cannot be compared to that of any other organ ; pathological researches will receive little advancement from that analogy which I have so frequently employed in investigating the morbid changes of other parts of the eye. The morbid alterations in the structure of the nervous system have hitherto been less successfully

investigated than those of any of the other textures which compose the human body. These researches are also attended with peculiar difficulties, more especially in the retina ; not only because the parts are extremely minute, and cannot be seen, like many of the other diseases in the living eye, but as very small deviations from the natural structure, which materially derange its functions, might escape even an attentive observer. Important, therefore, as the diseases of the nerve of vision undoubtedly are, much remains to be done by future observers in this part of pathology ; and it is only by the collection of accurate histories and dissections that we can expect to be able to refer the various combinations of symptoms which are observed in affections of this nerve to their respective morbid changes.

CHAP. XLII.

OF THE SYMPATHIES OF THE EYES.

THE eyes, like the ears, the mammæ, the testes, and all organs which are in pairs, have a sympathy with each other, both in health and disease; and this is, perhaps, more remarkable between the Eyes than any of the other organs, from the two optic nerves being intimately interwoven. Diseases which were originally confined to one eye are transmitted to the second eye; and even when an eye sustains a slight injury, the other frequently becomes weak and irritable.

This sympathy between the Eyes has

not escaped common observation ; and there is a disease, frequent in the eye of the *horse*, having the appearance of a specific inflammation, which usually first affects one eye and then the other, almost always sooner or later destroying vision. It is known among some Farriers, that, if the eye first affected with this disease suppurate and sink in the orbit, the disease does not attack the other eye, or subsides if it had commenced in it. Thus they have adopted a practice of destroying altogether the diseased eye, in order to save the other ; which is rudely done by putting lime between the eyelids, or thrusting a nail into the cavity of the eye-ball, so as to excite violent inflammation and suppuration. I have frequently succeeded in saving one eye of the horse by adopting this practice ; but I destroyed the eye by simply making an incision in the cornea, and discharging through it the lens and vitreous humor. In some diseases of the human eye, where the disease makes a similar progress, first

affecting one eye and then the other with complete blindness, the practice so successful in animals might, by judicious discrimination, be beneficially adopted.

But, besides this general consent between the two eyes, there is a striking sympathy between the corresponding textures of each organ. This is well exemplified in diseases. If the lens be opaque in one eye, it is probable that, sooner or later, the lens of the other will become similarly affected. St. Ives mentions the case of a man who received an injury of his eye, which produced a cataract, and some time after the lens of the sound eye became obscure; and what is curious, when the cataract of the wounded eye was extracted, the cataract in the other disappeared. The same thing is observed in the other textures. A young man received a wound in the eye, which produced violent inflammation of the iris; and in three weeks the iris of the other eye became inflamed. When treating of staphy-

loma,* a case is mentioned where a large staphyloma came on after a punctured wound of the eyeball, and some time afterwards the other eye also became staphylomatous.

Thus it usually happens, that not only both eyes are apt to suffer when one is injured or diseased, but that, when both are diseased, either at the same time or at different periods, they are generally affected with similar diseases.

Besides this remarkable sympathy between the two eyes, depending, no doubt, on the intermixture of some of the fibres of the optic nerves at the place of their union, the eyes have a great sympathy with other parts, from the nervous connection of the retina through the medium of the ophthalmic ganglion. This connection explains many of the phenomena that take place in diseases of the eye, which, in a pathological point of view are extremely interesting, and a knowledge of

* See Volume I. Chap. XII.

which may lead to important improvements in the treatment of diseases.

The distribution of the first branch of the fifth pair, or ophthalmic branch, explains how sudden exposure to a bright light, or looking at the sun, produces sneezing; how strong odors increase the flow of tears; how, during certain headaches affecting the scalp, the eyes become red and painful, the tears flow, light cannot be tolerated, and the eye-lids have involuntary twitches; how contusions about the internal and upper part of the orbit so frequently inflame and irritate the eye; and how wounds of the frontal, infra-orbital, and other branches of nerves, which form anastomoses with the ophthalmic ganglion, are sometimes followed by amaurosis.

The communication between the sixth pair with the great sympathetic, explains the connection between the eyes and the abdominal viscera, and this connection makes it probable that these nerves send

branches to the globe of the eye, an opinion some have denied. Petit found, that, when the par vagum was divided in animals, the eye of that side lost its lustre, and the pupil enlarged. Hence wounds and compression of the great sympathetic nerve, whether in the neck, chest, or abdomen, occasion convulsions of the eyes, and even blindness ; and children who have worms, have often dilated pupils, and other amaurotic symptoms. Besides, how often are diseases of the eyes sympathetic of affections of the chylopoetic viscera ?

The nerves of the eye have also a great influence on those of the stomach. If an instrument be turned rapidly before the eyes, it sometimes produces vomiting, and injuries of the eye often have a similar effect.* On introducing the couching-needle into a woman's eye, at the moment it pierced the coats she shrieked loudly, and was in a short time afterwards attacked with violent vomiting.

* Portal, Anatomie Medicale.

CHAP. XLIII.

OF INFLAMMATION OF THE RETINA, AND ITS CONSEQUENCES.

IT has already been observed, that the Retina, besides being composed of medullary pulp, has an interior cellular lamina interwoven with numerous blood-vessels. Changes in the structure and functions of these vessels produce a variety of the morbid phenomena incident to vision.

Inflammation rarely occurs in parts most supplied with nerves; the brain, the tongue, and the retina, being seldom inflamed.*

When the retina is affected with inflam-

* Bichât.

mation, the disease is marked by painful vision; intolerance of light; sparks of fire, or drops of a red colour falling before the eyes; little external redness; pain darting through the head; with more or less constitutional derangement.

The disease is generally brought on by excessive use, or by much exposure of the eyes to bright and dazzling lights; or it accompanies or participates in inflammatory affections of the brain and its meninges.

In some instances, the inflammation appears to be confined to the retina; whilst in others, the choroid coat or iris seem to be also affected.

Inflammation of the retina usually attacks both eyes.

Besides this active inflammation, to which the retina is subject, its exquisite sensibility and the delicacy of its functions, render the slightest deviations from the healthy state perceptible. Hence it is, that some people cannot expose their eyes to the common light of day without inconve-

nience ; that sparks of fire appear before the eyes of some people ; that strange images, which have been compared to flies, tadpoles, and such like, float before the eyes of others ; and that vision becomes impaired in a variety of different ways. In all these affections of the retina, it is extremely probable that each arises from some particular change in the state of the vessels of the vascular lamina ; but what the changes are which produce the different morbid symptoms, has not been at all satisfactorily ascertained. They have a strong analogy to those diseases of the brain, which are generally considered as arising from plethora ; and it is possible they may arise from a similar condition of vessels.

In most cases of Ophthalmia, in whatever texture of the eye inflammation commences, the retina generally participates ; the degree being always indicated by the increase of the sensibility of the eye to light.

CHAP. XLIV.

OF THE MORBID SENSIBILITY OF THE RETINA.*

IN some people the eyes acquire a morbid sensibility to light, where there is no reason to suppose that the retina is actually inflamed. This is very remarkable in those people who have long been confined in dark places, the eyes not being able to endure the ordinary light of day ; whilst, at the same time, they can distinguish objects in an almost inconceivable obscurity.

* Nyctalopia — Visus nocturnus — Cœcitas diurna— Amblyopia meridiana—Vespertina acies—Dysopia luminis—Photophobia.

Buffon relates a remarkable instance of an officer who was thrown into a dungeon, where the light never entered, there being no opening but a hole at the top, which was always kept closed, except when opened by the keeper to put down provisions. After remaining in it some weeks, the unfortunate man began to think he saw some little glimmering of light. This internal dawn seemed to increase from time to time, so that he not only began to discover the parts of his bed and other large objects, but at length could perceive the mice that frequented his cell. After some months confinement, he was set free ; but such was the effect of the darkness upon his eyes, that he could not, for some days, venture to leave his dungeon, and was obliged to accustom himself by degrees, to endure the light of day.*

Instances have also been narrated, and with every probability of truth, of prisoners

* Goldsmith's *Animated Nature*, Vol. II. page 161.

who had for many years been confined in dungeons, having been found altogether blind when they were exposed to the light of day. This calamity was said to have happened to some of those who were released from the Bastile, when that awful prison was destroyed.

This morbid sensibility to light is, in a lesser degree, exemplified by the improper use of shades and coverings to the eyes. It often happens that people wear a shade to relieve diseases of the eye, which are not attended with increased sensibility to light; but this finally takes place, and can be relieved by gradually exposing the eye to the ordinary light of day.

In like manner, as vision becomes impaired by the exclusion of the eyes from light, so any inordinate exposure produces an increased sensibility in these organs. Hence the inhabitants of those Northern regions, which are constantly covered with snow, keep their eyelids nearly closed, and do not see distinctly during the day. To

prevent their eyes from being injured, and to enable them to see more distinctly, these people wear an instrument consisting of a thin and light piece of wood, which covers both eyes, and in which there is a long, but narrow, horizontal slit or chink opposite to each eye. By this ingenious contrivance, the eyes are guarded from all lateral and dazzling light, whilst the chink is sufficiently wide to allow of a pretty extensive range of vision on the surface of the earth.

Travellers on the hot and sandy plains of Africa find their vision equally injured, as those who live in countries covered with snow; and they are in the habit of wearing a piece of black crape before their eyes, to diminish the quantity of light, as well as to prevent the particles of sand falling into the eyes.

The inhabitants likewise of some of the Eastern countries, where the sun shines with dazzling splendour, have a practice which enables them to see more clearly, whilst, at the same time, it beautifies the

countenance, by giving brilliancy to the eyeball. A black pigment, composed of finely levigated oxide of antimony, mixed with oil, is spread over the edge of the eyelids and roots of the ciliæ, and renewed as occasion requires. A nation called Iaggas, living in the Northern parts of Abyssinia, shew only the white of the eye, hiding the pupil in the day time beneath the Palpebra, least the eye should be hurt by the dazzling sun's rays.

Various other causes render the eyes susceptible of distinguishing minute objects in an obscure light. Boerhaave mentions the case of a man who could read during the night when he had drank too freely.* Richter saw a man who had an inflammation in the eye, in consequence of a blow, who could read in a dark night.† A woman who had suppressed menses, was blind during the day : the pupils becoming so contracted in a clear light, that they

* De morbis Oculorum.

† Wundartzneikunst, 3 Band. p. 478.

almost disappeared. As soon as the menstrual discharge returned, the disease subsided.*

It has been told of Tiberius Cæsar, that if he awoke in the night-time, he could see all objects as clearly as if they had been illuminated with a bright light ; but that, in a short time, the objects grew fainter and fainter, till at last they vanished. The same thing is also told of Alexander. Asclepiodorus is said to have read books in the night-time, without the assistance of any kind of light ; and Hieronimus Cardanus assures us, that, when he was young, he needed not the assistance of a candle to read in the dark.† Similar cases are mentioned by Willis, Briggs, and other writers ; the affection being denominated Nyctalopia, or night-vision.

* Pellicr.

† Porterfield on the Eye.

CHAP. XLV.

OF THE DISEASED CHANGES OF THE RETINA AND OPTIC NERVES.

1.—*Of the Diseased Changes of the Retina.*

THE retina has seldom been found changed in structure. The morbid changes are observed to take place either in the vascular membrane of the retina, or in its medullary lamina, or both these may be at the same time affected.

When Inflammation has taken place, I have seen the retina assume a buff colour, which was probably produced by the effusion of albumen. In a lady who had

suffered from arthritic amaurosis, I found one large spot of the retina quite opaque and considerably thickened.

Magendie found the retina converted into a fibrous membrane. “All the posterior chamber was lined by a membrane which was white, fibrous, very firm, and in every respect resembling an apaneurosis. This membrane, which was evidently the retina, covered an osseous shell, to which it adhered throughout by a firm cellular texture, forming nearly a complete envelope to the retina. Behind the bone was the choroid coat in every respect natural.”*

Morgagni found the retina quite indurated and white, adhering firmly to the capsule of the vitreous humor.†

The retina has been thickened, and changed in its structure, in eyes that have become disorganized.‡

Beer has observed, in some cases of

* Voyez Mem. Fibreux Dic. de Sci. Med.

† Ep. xiii. Art. 9.

‡ Morgagni, Ep. lii. Art. 30.

amaurosis, the vessels of the vascular membrane of the retina varicose. This is a change which very probably takes place in those cases of amaurosis where there are symptoms of congestion in the head, and where the disease is relieved by depletion. When the vitreous humor was evacuated from a lady's eye affected with amaurosis, a profuse hæmorrhage came on soon after the operation, which probably arose from a varicose state of the vessels of the retina, as well as those of the choroid coat. In this instance, the vitreous humor had degenerated into an aqueous fluid; and varicose vessels were observed on the sclerotic coat towards its posterior part.

It is not improbable, that, in many cases of impaired vision, where figures of various forms appear before the eyes, these symptoms arise from a change in the vessels of the retina.

The medullary portion of the retina has been found entirely wanting in persons who have long been affected with amaurosis.

It has already been observed, that Michaelis found the *macula lutea* in an amaurotic eye converted into a black spot.

Beer has made several dissections of that species of amaurosis which has been called Glaucoma, in all of which he found, that the obscurity in the vitreous humor commenced at the *macula lutea*, extending from it throughout the whole humor.

Walter found the retina altered in its appearance, and become tough.

Guerin found in a man who had been blind ten years, “the retina thin, and scarcely observable, but very tough.”*

In Fungus Hæmatodes, the structure of the retina and optic nerve is changed in a remarkable manner, the whole cavity of the eyeball becoming filled with a substance resembling medullary matter, and the optic nerve changed in its form, colour, and structure.†

* Malad. des Yeux.

† See Fungus Hæmatodes of the eye.

2—*Of the Diseased Changes of the Optic Nerves.*

The Optic Nerves have frequently been found diseased, changes having been observed both in the neurilema and in the medullary portion of these nerves.

Cheselden and Kaltschmidt found the optic nerves very small in children who died of Hydrocephalus.*

The optic nerve is sometimes very much elongated, from tumours pressing the eyeball out of its natural situation ; and, in several instances where this took place in a considerable degree, the functions of the retina continued unimpaired.

Morgagni found the “ optic nerve of a perfectly sound eye discoloured, and flattened like a piece of tape.”†

In a man who had never been blind, Morgagni found the optic nerve had los

* Voigtel's Handbuch.

† Epist. lxvii. Art. 21.

its natural colour, and had become thin, from the orbit to its union.*

Paw found in the optic nerve a large Hydatid, which had produced amaurosis.†

In Mr. Heaviside's Museum, there is a preparation of the optic nerve of an amaurotic eye, where a Tumor of considerable bulk has grown from the neurilema.‡

Wandeler found, in a young man who had amaurosis, "a hard swelling in the optic nerve."

Calculus Concretions have sometimes been found in the optic nerve. Walter found in the left optic nerve of a maniac, just before it passes through the optic foramen, a calculus concretion, of a rounded and flattened shape, and of two lines in diameter.§

Morgagni found on opening the head of

* Epist. lxiii. Art. 8.

† Obser. Anat. Rarior. Ob. ii.

‡ See Plate XV. fig. 1.

§ Museum Anatom.

a woman who had been blind, and who complained of excruciating pain in her head, “ a stone the bulk of a pea, in the very substance of the optic nerve.”

Morgagni found a large scrofulous tumour at the origin of the optic nerves.*

Ferro found the optic nerves surrounded and covered with albumen, in a case of amaurosis, which he considered as the effect of gout.†

Matter resembling Chalk has been observed surrounding the optic nerve.‡

Lallereux found in the middle of the substance of the Optic Nerve, a small tubercle of a hard consistence. This patient had been quite blind for two months, but the Iris was moveable, and no change of appearance had taken place in the Eye-ball.§

Lallereux found on opening the neurilemma of an Optic Nerve, that nearly one

* Ep. xiii. Art. 6.

† Voigtel's Handbuch.

‡ Voigtel's Handbuch.

§ Journal de la Société de Médecin, 1814.

half of its length was converted into a liquid matter. This eye had been amaurotic, and no apparent change was observed in it during life, except a greenish tinge at the bottom of the globe, the iris remaining moveable. From the iris of this eye, and also that of the foregoing case, retaining its mobility, M. Lallereux drew the general conclusion, that in those cases of amaurosis where the pupil remains moveable, the disease exists in the Optic Nerve, whereas when the pupil is permanently dilated, this structure of the retina itself has become changed.

Bonnetus relates the case of a gentleman who had been blind from his childhood, and after whose death it was found that “both optic nerves were not obstructed and contracted, but contorted.”*

In a man who had been blind in the right eye, the optic nerve was found of a brownish colour, and thin for about one finger's breadth from the eye. It con-

* Sepulchretum Anatom.

tained no pulp, but a fluid of a viscid consistence, and of a muddy grey colour. When this fluid was squeezed out, the neurilema remained in the form of a tube, the sides of which were thicker than natural. Beyond this portion, the pulp was firmer but discoloured, and the nerve thinner as far as the union of the two nerves.*

Cesalpinus found, in dissecting the body of a man who had the sight of one eye very feeble, “ one of the optic nerves attenuated, and the other of its natural form. The vision was weak in that eye which had the nerve diseased, the patient having received a wound on that part of the head.†

A boy nine years of age fell on his head, which was followed by a pain in the head, continued fever, and blindness. “ The optic nerves were found on dissection, very much wasted, and so fragile, that

* Voigtel's Handbuch. Erster Band.

† Sepulchretum Anatom.

they dissolved by touching them with the hand.”*

The optic nerves undergo great changes in *Fungus Hæmatodes*, and these changes are usually to be observed in the medullary portion of the nerve.†

Malacarne saw an instance where, besides the whole eye, the optic nerves, with the thalami and striated bodies, were wanting. In a child born with one eye, there was only one optic nerve. There were two at the origin, but in a short way they contracted, and formed into one trunk.‡

A case of Amaurosis is related by Morgagni, where, “ a remarkable bladder, full of the most limpid watery matter occupied the optic nerve at the place of their crossing.”§

* Voigtel's Handbuch.

† See *Fungus Hæmatodes* of the Eye.

‡ Voigtel's Handbuch.

§ Ep. xiii. Art. vi.

3.—*Of Changes in the Structure of the Optic Nerve, when the Eye has been destroyed.*

Changes from the healthy structure take place in organs when their functions are not performed. If the motion of a joint be destroyed, the muscles diminish in size, and their fibres become more delicate and of a paler colour; and, if the circulation through an artery be interrupted, the canal of the vessel becomes obliterated. Thus, also, when the retina can no longer receive the impressions of external objects, in consequence of the eye-ball being destroyed, the Optic nerve loses its natural appearance. The bulk of the nerve generally diminishes. Instead of being round and firm, it becomes thin and flaccid. It loses, too, its natural opaque white colour, becoming of a pale yellow, and appearing more or less transparent.

These changes have usually been observed

to extend only as far upwards as the union of the two nerves.

Mr. Allan Burns dissected the head of a woman who had been blind from infancy, from the cornea of both eyes being quite opaque. The Optic nerve of one side was small and pellucid from the eye-ball to where it joins its fellow. On the other side the nerve was quite healthy from the eye to the place of union, but beyond this it was small and disorganized. The preparation is now in my possession.

Bichât examined two cases where one of the eyes had sunk ; the Optic nerves of the diseased eyes were sensibly shrunk as far as the place of union, but beyond this both nerves were of the same size.*

Morgagni found the optic nerve of an eye that had been disorganized, more slender than that of the sound eye, of a more compact structure, and of a brownish colour. “ This change of structure and colour extended to the place where the two nerves

* Anat. Descrip. Vol. III. p. 153.

unite, but at this point, and above it, nothing but soundness could be seen on both sides.*

Vesalius dissected a woman where one eye was destroyed, and the other remained perfect. The optic nerve of the diseased eye, from its origin in the brain to its insertion in the eye, appeared much shrunk on being compared with the nerve of the sound eye.†

Morgagni found, on dissecting the Optic nerve of an eye which was shrunk, and which had probably been long blind, the nerve “extenuated to a very great degree, and cineritious. For about a finger’s breadth from the eye, it contained no medullary matter, but only a cineritious, turbid, glutinous humour. This being squeezed out by a slight compression, the cavity was left empty, so that the coat of the nerve seemed to be more like the coats of some canal. The coat was thicker than usual near to

* Epist. xiii. Art. 29.

† Bonnetus, Sepulch. Anatom.

that place where the two nerves unite; but here all difference disappeared, and both seemed perfectly sound at their union, and up to their origin.*

When an organ of sense is totally destroyed, the ideas which were received by that organ seem to perish along with it, as well as the power of perception.†

* Epist. xiii. Art. 8.

† Darwin's Zoonomia, Vol. I.

CHAP. XLV.

OF AMAUROSIS.*

THE term Amaurosis has had a very extensive application in nosology, having been employed to denote all those diseases of the eye, in which the functions of the Retina become imperfect or destroyed ; the eye appearing in other respects sound. Amaurosis, therefore, in its usual acceptation, signifies a symptom of disease, as well as a distinct affection.

It has already been noticed, that Amaurosis accompanies almost all those changes of structure which have been met with in

* Gutta Serena.—Black Cataract.—Palsy of the Retina.—Suffusio nigra.—Der Schwarze Staar.

the retina and optic nerves ;* and amaurotic symptoms also accompany some of the diseases of the choroid coat,† and other internal parts of the eye-ball. The variety of morbid changes of these parts is sufficient to account for the number of the symptoms of amaurosis which authors have enumerated ; and so seldom has this disease become the subject of pathological research, that scarcely any attempt has ever been made to refer a particular assemblage, or combination of symptoms, to the concomitant diseased change.

Besides those cases of Amaurosis, where the paralytic state of the retina accompanies a change of structure in some of the parts within the orbit, amaurotic symptoms also arise from affections of the Brain and Nerves, and from Sympathy with other diseased organs, more especially the alimentary canal.

* See Chap. XLIV.

† See Chap. XXIX. and Chap. XXX.

1.—*Amaurosis from Diseases of the Brain.*

Amaurosis accompanies many affections of the Brain.

In all those diseases where the quantity of blood in the encephalon is increased, or the actions of the arteries changed, the functions of the retina are more or less affected, and, in some cases, a complete Amaurosis is produced. From the course of the ophthalmic arteries, the situation of the *circulus arteriosus*, and the peculiar distribution of these arteries in the different tribes of animals, there can be no doubt that an equal and uniform current of blood in the internal parts of the eye is essential to vision. It is, therefore, easy to conceive how any disturbance in that circulation should interfere with the functions of the retina.*

Thus persons of a plethoric habit, when

* Ware's Works, Vol. 1. p. 428.

they hang down the head, or by any means increase the circulation of the blood, frequently excite the appearance of Spots before their eyes, and sometimes complete blindness.

It was observed by Sauvages,* that the pulsations of the optic artery might be perceived by looking attentively on a white wall, well illuminated. A kind of net-work, darker than the other parts of the wall, appears, and vanishes alternately with every pulsation. This change of colour of the wall he ascribed to the compression of the retina, by the diastole of the artery. The various colours produced in the eye by the pressure of the finger, or by a stroke on it, as mentioned by Sir Isaac Newton, seem likewise to originate from unequal pressure on various parts of the retina. Richter mentions the case of a plethoric person, who, when he held his breath, and looked at a white wall, perceived a kind of net-work, which alternately appeared and

* Nosol. Meth. Class VIII, Ord. 1.

disappeared with the diastole and systole of the arteries ; a phenomenon probably occasioned by the plethoric state of the vessels of the retina.* In a staphylomatous eye, on the cornea of which was distributed two large red vessels, the patient could distinctly perceive a vermicular motion. Mr. George Young saw a cadet at Woolwich, who, from being obliged to wear a very tight neckcloth, and collar of the coat tightly clasped, had his sight much impaired ; the sphere of vision was diminished, the pupils were dilated, and he had the appearance of flies constantly floating before his eyes.

Amaurosis is frequently brought on by keeping the eyes with great attention, and for a long time, fixed on minute objects, more particularly if the objects are not diversified ; for a frequent change in the objects has a material effect in refreshing the eye.

Tailors and milliners, who are employed

* Richter's Anfangsgründe.

at very minute needlework, and who, when at night, have the objects brightly illuminated, frequently become Amaurotic.

Vision is also particularly injured, when the objects are looked at with one eye. I have seen several officers of the navy, who had lost the sight of the eye with which they had been in the habit of looking through the telescope.

I have also known several instances of soldiers and sailors who had become blind after having undergone great fatigue. Richter relates a case of a man who became suddenly blind while carrying a heavy burden up stairs. Another man, who worked very hard for three successive days, became blind at the end of the third day.*

The effects of intoxicating liquors on the brain and retina are well known; vision becoming obscure and often double. Boërhaave relates the case of a man, who, whenever he was intoxicated, laboured under a complete Amaurosis. The disease came

* Anfangsgründe, 3. Band.

on by degrees, increasing with the quantity of wine ; and, after the intoxication went off, vision returned.*

Amaurosis has also been known to arise from other causes which increase the quantity of blood in the encephalon. Thus the cessation of any accustomed hæmorrhage, such as that from the nose or rectum, has been observed to produce Amaurosis. Pechilini saw a young woman who had Amaurosis during a suppression of the menstrual discharge, which was removed the moment menstruation returned.† Rolfini mentions examples of women, who, as often as they became pregnant, were blind to the time of their delivery.‡ Beer saw a woman who was amaurotic during three successive Pregnancies. The disease commenced immediately after each impregnation, and between the third and fourth months she became quite blind. After the two first

* De Morbis Oculorum.

† Ob. Med.

‡ Disputatio de Gutta Serena.

confinements vision was restored ; but after the third, it never returned.* Portal saw a woman who became amaurotic after the delivery of her first child ; after her second, she became deaf ; and, after the third, almost dumb. She had not lost any blood during either of these pregnancies, but was bled during the next, and she had no new affection, the former, at the same time, diminishing.†

Amaurosis has also been known to come on after the healing up of ulcers, or drying up of eruptions.

Beer says he has frequently seen Amaurosis produced among the Polish Jews, from cutting off the *Plica Polonica*.

Amaurosis is sometimes produced from a sudden cessation of the secretion of milk.

Amaurosis has likewise been known to be occasioned by a sudden fright, and other violent mental emotions.

Amaurotic symptoms frequently come

* *Lehre der Augenkrankheiten*, II. Band. Wien, 1817.

† *Anatomie Medicale*.

on before or after a fit of apoplexy. Bonnetus, in a young man who died paralytic, and who, besides losing the use of one side of the body, lost the sight of the eye of the same side, found “the anterior cavity of the cerebrum filled with blood, and a quantity of serum.”*

Amaurosis often remains after Fevers, which have been accompanied by inflammatory affections of the brain. In a gentleman who had a severe attack of fever at the Isle of France, accompanied with a very marked determination of blood to the head, not only a complete and permanent Amaurosis took place, but for many months he was also deprived of the senses of Taste and Smell.

Instances have been observed, where a complete amaurosis has come on from a stroke of Lightning. I have seen one case of this kind, in which the sight was restored by the repeated application of small blisters over the frontal nerve.

* Sepulchretum Anatomicum.

I have known two instances where Amaurosis came on after a *coup-de-soleil*.

Injuries of the Brain are sometimes followed by amaurosis. I have seen several cases where vision was suddenly destroyed from a blow on the head. In other cases the loss of sight has been gradual. Beer knew an instance of a person becoming quite blind by another person coming behind him and squeezing forcibly his hands on both eyes. Richter saw a man who received a smart blow on the ear, and immediately lost his sight.

A young man got a smart blow on the eye, which was immediately followed by a complete amaurosis. Richter mentions a person who lost his sight during a violent fit of Vomiting.

Hildanus saw an amaurosis arise from Sneezing.

Amaurosis is a common symptom of internal Hydrocephalus, both eyes being generally affected ; the accumulation of

water in the ventricles probably compressing the two optic thalami.

Tumours of the brain frequently produce Amaurosis. Ford found the optic thalamus, in a case of amaurosis, enlarged to the size of a hen's egg. In a young woman who had lost the sight first of the left and then of the right eye, subsequent to a violent fever and severe pain in the head, Plater found a tumour in which the optic nerves were involved at that part where they emerge from the brain. Dr. Köhl of Leipsic detailed to me a case of Amaurosis, in a young man of healthy appearance, who died after being blind a few months. A tumour, as large as a hen's egg, was found where the optic nerves decussate, part of which was firm, and part filled with a fluid. Bonnetus relates a case where an abscess of the mammillary process, which proved fatal, was accompanied with amaurosis. Bonnetus also found "a steatomatous tumour, the bulk

of a fist between the cerebrum and the cerebellum, producing amaurosis.”*

Exostosis has been sometimes observed growing from that part of the sphenoid bone, forming the sella turcica, and on which the conjoined optic nerves lie. In the Josephine Academy, there is a preparation of these parts taken from a boy who had been affected with Amaurosis; and where a spicula of bone was found growing up from the spot just mentioned, transfixing the conjunction of the optic nerves.

2.—*Amaurosis from Poisons and Narcotics.*

Many of those substances which act directly on the nervous system, have an influence upon the Retina, and produce amaurotic symptoms.

Bosman narrates a case, where Amaurosis came on from the Saliva of a Serpent getting on the face.

A young healthy man, when lying awake

* Sepulchretum Anatomicum.

early in the morning, perceived a large Spider on the corner of his bed. When the animal was immediately over his head, his wife seized it, and it emitted a drop of liquid which fell directly on his eye. He rubbed the eye, and immediately found, that he could see nothing, at the same time there did not appear any external change.*

In one case, an amaurosis proceeded from the bite of a Mad Dog.†

Scarpa has observed, that when the infusion of Digitalis, Stramonium, Tobacco, and several other medicines of the same class, are taken into the stomach, they sometimes produce an amaurotic blindness.

A case is mentioned by Conradi, where Amaurosis was produced by the daily application of the water of the *Lauro-cerasus*. A quantity being put into the eye to remove a speck on the cornea, in a short time the pupil became dilated, and the

* Boerhaave de Morbis Oculorum.

† London Med. Obs. Vol. III.

iris paralytic, with a complete loss of vision. The eye recovered by the frequent application of blisters.

An Amaurosis was in one case produced by the injection of the juice of Belladonna, and cured by the use of volatile remedies.*

Beer himself had a complete Amaurosis, which lasted only a few hours, in consequence of a mistake in the quantity of Laudanum, given as a glyster.

In the Malacca Islands, there is an amaurosis well known to strangers, which is attributed to eating hot barley. In this state, the barley is supposed to throw out a narcotic vapour.

Beer has known Amaurosis produced from Lead, both when used as a cosmetic, and taken internally.

Beer mentions that he had seen a woman, who was attacked with violent vomiting as often as she drank Chocolate, and for several hours afterwards remained quite

* Observations on the effect of the Belladonna, &c. &c. by Mr. Wishart, in the Edinburgh Medical and Surgical Journal, Vol. III.

blind. He considered this occurrence as the consequence of the exertion of vomiting ; but having had occasion to see her affected with vomiting, from a different cause, without the blindness being produced, he prohibited the chocolate, and she had no return of the blindness.

3.—*Amaurosis from Wounds of the Frontal Nerve.*

Wounds of the eye-brow, which injure the Frontal nerve, have frequently been known to produce Amaurosis ; the amaurotic symptoms coming on, in some cases, instantaneously, and in others long after the wound has been healed.

Morgagni mentions having seen a case of Amaurosis produced by a wound above the eye-brow, which, he observes, explains a passage of Hippocrates. “The sight,” says the Father of Medicine, “is obscured in wounds which are inflicted on the eye-

brow or a little higher.”* This curious fact I have seen illustrated in several instances, and is an example of the sympathy which exists between parts whose nerves have a direct communication; the ophthalmic branch of the fifth pair sending off the frontal nerve, and also a twig to join the third pair to form the lenticular ganglion.

It is only when the Frontal nerve is wounded or injured, and not divided, that Amaurosis takes place; for, as shall afterwards be observed, amaurosis following a wound of this nerve, may sometimes be cured by making a complete division of the trunk nearest its origin. Portal saw a child, who received a slight puncture on the forehead, with the point of a knife, which was followed by a considerable convulsion of the upper eye-lid. This ceased when a small incision was made at the place of the puncture.†

* Letter xiii. Art 5.

† Anatomie Medicale, Tom. iv. p. 167.

A gentleman received an oblique cut in the forehead, which, from its direction and depth, must have injured the Frontal nerve. The wound was not accompanied by any severe symptoms, and soon healed. But afterwards the vision of this eye began to fail, and in a few months was completely destroyed; the pupil was much dilated, the iris was not influenced by variations of light, and had slight tremulous motions. A sailor got a blow on the edge of the orbit from a ram-rod, at the place where the Frontal nerve passes on the brow. The vision of that eye was instantly destroyed, and when I saw him several years after the accident, the eye remained amaurotic, with a dilated and immoveable pupil. A cataract had formed in the other eye.

An officer at the siege of Badajos, received a deep wound on the eye-brow by the piece of a shell, which from its direction must have injured the frontal nerve. Great inflammation and pain succeeded the wound, the vision of the eye became

gradually imperfect, and, after a few months, was entirely lost. The pupil was very much dilated and immoveable, and the crystalline lens opaque.

Wounds of the Infraorbital nerve, and *portio dura*, are sometimes followed by amaurotic symptoms. Beer mentions an instance of the former, and I saw an officer in whom a ball wounded some branches of the latter nerve, which was followed by Amaurosis.

This connection between the branches of the fifth pair of nerves and retina affords an useful channel for applying remedies in diseases of the retina.

4.—*Of Amaurosis from Disorders of the Primæ Viæ.*

The sympathy which exists between the Chylopoetic viscera, and various parts of the nervous system, particularly the brain, and organs of sense, has long been well known to physiologists. The headaches produced by improper food, and the

vomiting brought on by injuries of the brain, are sufficient proofs of the reciprocal sympathy of these organs.

The senses of hearing, taste, and smell, are also affected in many of the diseases of the digestive organs; and very frequently these affections influence the functions of the Retina. These diseases ought strictly to be considered as sympathetic, or symptomatic, forming a class very different from those where the amaurotic symptoms arise from a change of structure in any of the parts which compose the organ of vision.

Amaurotic symptoms frequently accompany Worms in the intestines. A child who had worms, besides amaurotic symptoms, had nearly lost altogether the sense of hearing, but recovered both senses as soon as the disease of the bowels was removed. Vandermonde relates the case of a girl, who, from worms, and disordered *primæ viæ*, lost her Vision and Speech.*

* Journal de Médecine, Tom. x.

Beer remarks, that he has never seen Amaurosis, with complete blindness, from disorders of the *primæ viæ*, except from worms.

Amaurotic symptoms frequently affect those who are subject to Biliary complaints. A lady who was subject to violent headaches, and vomiting of bile, sometimes became perfectly blind for several hours. Richter mentions a man who lost his sight a few hours after being in a violent passion, and recovered it again the next day, by taking an emetic. Those who are afflicted with bilious headaches, have sometimes amaurotic symptoms. In the common Megrin, when the pain affects the frontal branch of the fifth pair of nerves, the retina is very liable to be influenced.

This sympathy is strikingly illustrated in wounds of the frontal nerve, and it is probable, that the same nervous connection between the frontal branch of the fifth pair, and the alimentary canal, and between that canal and the retina, depends

on the distribution and connections of the fifth pair of nerves.* A gentleman who had long been subject to headaches, affecting chiefly the frontal nerve of one side, and whose digestive organs were always imperfectly performing their functions, became amaurotic in the corresponding eye, the pains in the frontal nerve at the same time ceasing.

A woman became blind whenever she was troubled with what are termed Acidities in the stomach.

A dropsical woman became blind on the water being discharged from her abdomen.†

Bartholin ‡ relates the case of a monk who lost his sight as often as he shaved his beard, and recovered it again when the beard began to grow. With permission of his superiors, he gave up shaving !

* Anfangsgrunde.

† See Sympathies of the Eyes, Chap. XLIV.

‡ Epist. Med. Cent. 3, Epist. 67, n m. 27.

5.—*Symptoms of Amaurosis.*

I have already remarked how varied and multiplied are the symptoms of Amaurosis, and how deficient our knowledge is when an attempt is made to refer particular assemblages of symptoms to the morbid changes which accompany them.

It may in general be said, that in amaurotic eyes are observed all varieties of change in the size, form, position, and motions of the Pupil. That opening is sometimes so much enlarged, that the iris can scarcely be seen, and at other times it is unnaturally contracted.

Sometimes the Iris is perfectly immovable; at other times it retains its natural sensibility. In some instances, that sensibility is increased; the motions of the iris pointing out how far the ciliary nerves are affected, a circumstance of importance to be known.*

* See Wenzel on Cataract.

The pupil is sometimes regular, sometimes irregular, in its form. Sometimes the pupil is removed from its natural position, upwards, downwards, inwards, or outwards, but most frequently in a diagonal direction between upwards and inwards.*

The colour behind the pupil is sometimes black, clouded, greenish, a muddy amber, or a horny colour.

Sometimes Amaurosis comes on suddenly, and at other times very slowly.

Amaurosis is sometimes periodical, but most frequently permanent. Beer says that he has had several patients who, in the course of three to four years, have had complete Amaurosis from four to six times.

Vision is sometimes altogether destroyed in Amaurosis, the patient not being able to distinguish between sunshine and complete darkness. In some instances it is only imperfect. The imperfections of vision

* Beer. *Lehre der Augenkrankheiten.*

consist sometimes in a diminution of the power to distinguish small objects, these appearing to be concealed by a mist or smoke ;* or a diminution in the sphere of vision,† so that the person only sees a part of any object. Sometimes the upper half alone remains distinct, sometimes the inferior, and sometimes either of the lateral portions. A lady saw perfectly except in the central part of the field of vision. Sometimes objects become distorted ;‡ and a variety of images and colours appear before the eyes of those afflicted with Amaurosis.§

A person with Amaurosis sometimes becomes short-sighted, and at other times long-sighted.

Amaurotic patients, when they wish to look at a small object, frequently require to have it brightly illuminated.||

* Visus Nebulosus.

† Hæmyopia—Visus interruptus vel dimidiatus.

‡ Visus Defiguratus.

§ See Ocular Spectra, Chap. L.

|| Lighthunger.

Amaurosis is, in some instances, accompanied with double vision.

Sometimes the disease is accompanied with, and sometimes it is without, pain.

In some cases of Amaurosis there is an involuntary rolling motion of the eye-ball, accompanied with a peculiar gaze, as if the eye was in search of light.

“ But thou
Revisitest not these eyes, that roll in vain
To find thy piercing ray, and find no dawn,
So thick a drop serene hath quench'd their orbs !”

There is one symptom which has been considered as always accompanying Amaurosis,—a peculiar cast, or a confirmed Squint of the diseased eye. Richter has observed, that this is the only symptom to be depended on when the veracity of the patient cannot be trusted.

In some cases of Amaurosis, where the blood-vessels of the retina and choroid coat seem to be in a varicose state, a corresponding change may be observed in the vessels of the white of the eye.

It is not unusual for a Cataract to be formed in an amaurotic eye ; and sometimes the vitreous humor is also disorganized.*

Amaurosis affects people at all periods of life.

Sometimes Amaurosis is Congenital, and, when this is the case, it is usually accompanied both with cataract and involuntary motions of the eye-ball.

Amaurosis affects eyes of all colours, but is generally supposed to be most prevalent in black.

Amaurosis is sometimes hereditary. I have known several instances of this kind, and similar cases have been recorded.† Beer knew a family, in the third generation of which, all the females became amaurotic at the cessation of the catamenia, except those branches who had children. The male branches shewed a dis-

* Glaucoma.

† Edinburgh Medical and Surgical Journal, Vol. XII.

position to the disease, but none became blind.

Sometimes only one eye is affected with Amaurosis, and sometimes both become blind at the same time. I think it may be remarked, as a general observation, that, when only one eye becomes at first amaurotic from a sympathetic affection, there is little danger of the other eye becoming blind ; but that, when Amaurosis is produced by any organic change in one eye, the other is in danger of being sympathetically affected. This observation coincides with what has already been said of the sympathy which exists between the corresponding textures of each organ.*

* See page 140, Chap. XLII.

CHAP. XLVI.

OF NIGHT-BLINDNESS.*

THOSE afflicted with Night-blindness, have their sight impaired from the time when the sun sets till it rises the following morning, vision being perfect during the day.

I have never observed this disease in Britain, but it occurs frequently on the continent of Europe, and in the more southern latitudes. In some countries it is

* Hæmeralopia—Disopia tenebrarum—Ambliopia crepuscularis—Visus diurnus—Cæcitas nocturna—Aveuglement de Nuit—Nachtblindheit.

endemic, and in others it appears as an epidemic at certain seasons of the year.*

In this disease no changes can be observed in the appearance of the eyes, except some slight alteration in the motions of the iris. In some instances the pupil is a little dilated, and loses its natural mobility during the day, whilst, in others, the functions of the iris are perfectly natural, except during the night, when the pupil is always more or less enlarged.

This disease always attacks both eyes simultaneously.

The progress of Hæmeralopia is sometimes slow, at other times sudden. In the beginning of this affection the person may be able to distinguish objects a short time after sunset, or he may see a little by clear moonlight; but as the disease advances, vision becomes more imperfect, and he is finally unable to discover even large

* *Recueil périodique de la Société de Médecine*, Tom. II. *Journal de Médecine* pour l'année 1756.

† *Boyer, Maladies Chirurgicales*, Tom.V. Paris, 1816.

objects, being only able to distinguish light from darkness. In some instances the person becomes blind at twilight, and on the following morning at sun-rise he perfectly recovers his sight.

It is a circumstance very remarkable, that those affected with this disease see distinctly in an obscure day, whilst the sun is above the horizon ; but, whenever the sun sets, however bright may be its reflected light, such patients see objects very imperfectly. Thus many of them, in a cloudy moment, know the precise time of the sun's setting, though that period cannot be distinguished by other people.*

This disease has generally been observed to continue from three weeks to eight months, when no remedies have been used.

Sometimes Hæmeralopia gets well spontaneously; in other instances, vision becomes more or less impaired; and it has been known to terminate in permanent blindness.

* Boyer, *Maladies Chirurgicales*, Tom. V.

Those who have had one attack of this complaint are very apt to have a relapse every year, and always at the same season. Boyer relates the case of a man, forty-three years of age, who had been attacked with it every spring from the age of twenty-three.

People of all ages, and eyes of all colours and forms, are equally subject to this disease.

Hæmeralopia is accompanied with pain and weight in the head, which almost always increase towards the evening.

Symptoms of plethora frequently accompany this disease, the patients complaining of giddiness, particularly when the head is bent downwards, or they are occasionally affected with a dimness of sight during the day.*

Night-blindness seems, in most instances, to be connected with derangement of the *primæ viæ*.

It is said to affect those labouring under

* Essay on Hæmeralopia by Mr. Bamfield. Medico-chirurgical Transactions, Vol. V.

Scurvy, and not to yield until the scorbutic affection is removed.

Night-blindness has been supposed to arise from a mere inability of the retina, to be excited by the slighter stimulus of the evening light, the difference between the splendour of the sun's light, and that of the moon or candles being immense.* In like manner, it is observed, that some animals, as owls, cats, &c. see only in a very moderate light ; whilst there are other tribes, as fowls, which become very blind at twilight.

* The strength of moonlight is computed to be $\frac{1}{300000}$ th part of that of daylight.

CHAP. XLVII.

OF COLOURED VISION.*

THERE is a remarkable peculiarity in vision, which may rather be considered a congenital imperfection, than a disease. It has been denominated Coloured Vision, the person affected with it having no perception, or at least a very faint one, of some of the principal colours.

When a number of objects of different colours are placed together before a person whose vision is imperfect in this respect, he can distinguish differences between

* Suffusio colorans.—Visus coloratus.—Crupsia.—Farbenschen.

most of the colours, without knowing exactly in what that difference consists ; and, in general, if the colours are presented to him separately, he is unable to give them names, or to say to what class they belong.

He has a distinct perception of colours purely yellow or blue, such as gamboge or Prussian blue. These colours he never mistakes, either when seen separately, or when lying amongst other colours ; and all other colours seem to him only modifications of these. The colours which appear in the solar spectrum, for example, are to him only two, viz. blue and yellow, whereas, to a perfect eye, there appears in that image to be seven.

He experiences great difficulty in distinguishing the different kinds of green, most of those modifications of colour called green appearing to him either yellow or blue, in proportion as one or other of these colours predominates. Grass appears to be yellow, generally not so light as gamboge, but near the colour of an orange ;

and, if a piece of red cloth, and another of the colour called olive, be presented to him, though he can perceive some difference between them when they are both together, yet, when seen separately, he continually mistakes one for the other. The appearances of green to his eye depend in some measure upon the quantity of light which falls on objects of that colour, some kinds of green cloth, when the sun shines strongly upon them, appearing yellow ; but, in a shaded place, and even in common day-light, they appear like an impure blue.

The different kinds of red create in him equal embarrassment ; for vermillion, and all the varieties of red which incline to that colour, appear to be yellow, whilst carmine, and all the reds which incline to that colour, appear to him to be blue. An officer's red coat, for example, appears to him to be yellow, and his sash blue. Red ink, when fluid, appears yellow ; and, when washed on paper and dried, it appears blue.

These are the appearances of colour to his eye when seen by day-light ; when they are viewed by candle-light, the only difference is, that carmine, and all objects of that class of red, appear yellow, like the vermillion reds ; the appearances of vermillion reds, and of all other colours, being the same as during the day.

These defects exist in some people to a much greater degree than in others ; and those in whom vision is thus defective, are frequently led to make very absurd mistakes with respect to the appearances of objects. A man who was employed in a woollen-draper's shop, made some ridiculous errors in selling the cloths, from having this defect in his vision.

This imperfection of vision is sometimes Hereditary. Several branches of a noble family in this country have been remarkable for having it. A similar example is given in the Philosophical Transactions,*

* Vol. LXIII. Part II.

and another in the Medico-chirurgical Transactions.*

It is not improbable that this defect of vision arises from a greater sensibility of the retina to the impressions of the blue and yellow-making rays, than to those of any of the others. This may depend upon the refractive power of the humors, by which the rays of these two colours are more accurately united on the retina than rays of any other colour, and, consequently, the images formed there of objects reflecting these colours are more distinct than those formed of objects reflecting the other colours. When the colour of a body is compounded of several colours, the superior correctness of the image formed by the blue and yellow rays reflected from it, may cause the sensations which those colours excite to preponderate over the sensations caused by the other colours, and thus may cause in

* Vol. VII. p. 477. See also Manchester Memoirs.

the mind of the observer the perception of that compound colour to be different from the perception of the same colour to another person, whose eye forms images of external objects differently.

The imperfection of vision which has here been described, though it does not occur frequently, yet is by no means unusual, some striking examples having fallen within my own observation. From these, with the able assistance of Mr. Narrien, of the Royal Military College at Sandhurst, the foregoing account of this curious peculiarity of sight has been collected.

When this state of vision is better understood, it is not improbable that it may lead to an explanation of some of the phenomena of light and colours, and explain, more satisfactorily than has hitherto been done, some of the functions of the retina.

CHAP. XLVIII.

OF SQUINTING.*

A PERSON is said to Squint when the axes of the two eyes are not directed to the same point.

The degree of Squint varies in different instances; sometimes the eye having merely a slight cast, whilst in others the eye-ball is very much turned inwards. In one instance, an eye squinted to such a degree, that not only the pupil, but the whole cornea was hid. The other eye being quite blind, the patient could only see by turning the cornea of the squinting eye outwards, which she had acquired the power

* Strabismus — Strabositas — Louche — Luscitas — Visus obliquus — Das Schielen — Les yeux de travers — Distortio oculorum.

of doing by pressing with the point of her forefinger in the internal angle till the cornea was exposed. Whilst with her finger she retained the eye-ball in this position, she could see distinctly, whereas, without this contrivance, she was perfectly blind. The squint was attributed to severe headaches, to which the woman had been subject for many years.

In all cases of squinting, the affected eye is either turned inwards towards the nose, or in the opposite direction, outwards; it has never been observed turned upwards or downwards. When it is considered that the elevation or depression of the globe of the eye is produced by similar muscles in the two eyes, whilst the lateral movements depend on the actions of the adductor of the one eye, and the abductor muscle of the other, we can conceive the frequency of the lateral squint, and why a squint upwards or downwards never exists, or is at least extremely rare.

It has been said by some,* that Squint always arises from a disparity in the vision of the two eyes, or from a change in the structure of one eye. This, however, is not the case, for sometimes both organs squint when there are specks on the cornea, or an alteration in the position of the pupils. Neither does a squint always take place when there is a disparity in the vision of the two eyes ; for in many instances when the sight of one eye is diminished, no squint takes place ; and, as is observed in another place,† few people see equally well with both eyes. In some cases of Squint, I have not been able to detect any decided difference in the vision of the two eyes.

The derangement in vision, produced by Squint, is seldom considerable. Some people squint without being conscious of it : others have their vision rendered indistinct, and some have double vision ; this

* Mémoires de l'Académie, 1745.

† See Chapter LI. On the Disparity of the two Eyes.

being particularly the case when the squint is recent, and not to any great degree. For, as the patient accustoms himself to look at objects only with the sound eye, the sensation transmitted by the other eye being feeble, becomes gradually effaced; and this fault may also be corrected by the sense of touch,—a proof that single vision with two eyes is not produced from the images of an object falling on corresponding points in the two retinae, but the result of habit. Where the Squint is very considerable, the two eyes cannot see the same object, and, consequently, double vision cannot take place.

Buffon observed some people who squinted, make use of the two eyes alternately, according as the objects were placed more or less distant; with the feeble eye they looked at near objects; and with the stronger, objects at a distance.

In most cases the Squint may be removed from the one eye to the other, by

shutting up, for a certain length of time, the sound eye, and making use only of the eye which squints. When this has been done, and both eyes opened, the eye which originally squinted will now be the one whose axis is directed to the object, whilst that which was sound now squints. This was strikingly illustrated in a young lady, who long had a complete squint in one eye from a corneal speck, and whose other eye was attacked with pustulous ophthalmia. The violence of the symptoms made her keep the inflamed eye covered with a shade, whilst the other, with which she saw but imperfectly, served the common purposes of life. In a few days, to the astonishment of all who knew her, what formerly was the sound eye, now became the squinting one ; but, as the inflammation subsided, and she began to make use of that eye, the squint gradually left it, and returned to the one originally affected.

Squinting generally comes on during

infancy. It usually proceeds slowly, but sometimes suddenly.

A squint may arise from various causes. It is sometimes produced from Chylopoetic derangement,—from Worms,—from organic affections of the Encephalon,—from Dentition,—from Imitation or Habit,—from long position of the head in one posture,—from the transparency of some of the parts of the eye-ball being destroyed,—or from a disparity in the vision of the two eyes.

1.—*Squint from Chylopoetic Derangement.*

Besides changes in the sensibility of the retina, which accompany some diseases of the organs of digestion, I have observed well marked cases of Squint which arose from similar causes. In cases of this description, the Squint has usually come on gradually, varying in degree at different times ; and in some instances, the state of

the eye forms an accurate measure of the degree of derangement in the alimentary canal.

This cause of Squint is particularly frequent among young people, though it is met with at different periods of life. A lady thirty years of age, who had frequently during several years the *primæ viæ* much deranged, had at last a severe attack of pain in her head, extending to the right eye; the bowels having been at this time unusually confined. The affected eye then squinted, and she had double vision. In proportion as the functions of the bowels were restored, the squint diminished, and before the patient ultimately recovered, every stage of amendment, or occasional change, was distinctly marked by a corresponding diminution or increase in the squint.

2.—*Squint from Worms.*

It is by no means unusual to see children who have Worms squint. In such cases the squint usually comes on gradually, and whilst it continues, the degree varies on different days, and even several times in the same day. Besides the squint, all the symptoms of worms are present in such cases.

When the worms are removed the Squint generally disappears, whilst in other cases it never leaves the patient.

3.—*Squint from Organic Affections of the Head.*

In many organic affections of the Brain and its meninges, the disease at some period or other is often accompanied by a Squint. This is very remarkable in Hy-

drocephalus, and in diseases which affect parts contiguous to the thalami and tracti optici. Abscesses, and the various kinds of tumours which are formed about these parts, are generally accompanied with a squint; and so are also many affections of the adjacent bone. Indeed, Squint is one of the symptoms which often points out the seat of disease to be in the encephalon.

A blow on the head has in many instances produced a squint; the squint, in such cases, probably arising from the effects of the blow on the optic thalamus. In some cases, the squint is one of the immediate effects of the injury; but in others, it does not take place till some time after the accident. In Squints arising from injuries of the head, the distortion sometimes goes off along with the other effects of the accident; but in some cases it has been permanent.

A squint has also been known to arise from a wound of the Frontal nerve. The

nervous anastomosis, which has already been noticed, between the frontal branch of the fifth pair, and other nerves distributed within the orbit,* affords a satisfactory explanation of the peculiar effects of such an accident.

A Squint often accompanies amaurosis.

4.—*Squint from Teething.*

During the process of Teething, there are a variety of nervous affections occasionally produced, and one of these is a squint.

The Squint in such cases is sometimes slight, and goes away when the teething process is completed. In other instances the squint is to a greater extent, and is permanent.

5.—*Squint from Imitation and Habit.*

Some children have been known to acquire a habit of squinting; and there are

* See Chap. XLII.

also many instances of squinting being produced from imitation. A child two years of age acquired a complete Squint, from living for a few weeks in a house where there was a young lady who squinted. In another instance, a child got a squint whilst teething, and her sister, by frequently imitating her, at last acquired the same habit. A child who suffered from a violent fit of hooping-cough during the night, was observed to squint the following morning. In a short time one of her sisters acquired a squint. I have also known instances of children squinting, whose mothers or nurses squinted.

6.—*Squint from unusual Position of the Head.*

It sometimes happens, that when a person is long confined in one posture, and the head in such a position, that only one of the eyes can see the window, or can be

chiefly employed in looking at objects, the other eye acquires a Squint. But this squint is usually temporary, disappearing by a change in the position of the head, or when both eyes are again used to look at objects. A young lady was confined for several weeks to bed, with a disease of the hip-joint, in a room lighted by a window on one side. She was in the habit of turning her eyes constantly to the light, and thus contracted a squint ; which was easily cured by simply changing her position in the room.

Another young person, from remaining ten days on one side, acquired a squint, which lasted seven years ; it was afterwards removed by looking a great deal in the opposite direction.

7.—*Squint from Disparity in the two Eyes.*

In those who have a great disparity in the vision of the two eyes, it sometimes, though rarely happens, that the person squints. In most instances, where the vision of the two eyes is unequal, there is only a peculiar cast of the eye, as it is usually termed.

There is nothing more remarkable in the history of squinting, and it is the same with regard to double vision, than that, as far as the pathologist can discover, the same disease in the eye does not always produce a squint. Many have a considerable disparity in the vision of the two eyes, who have no squint, whether this disparity arises from a speck on the cornea,—from any particular species of cataract,—from differences in the sphericity of the cornea,—or from a difference in the sensibility of the two retinae.

I have known a few instances of people, advanced in life, suddenly acquiring a squint, generally accompanied with double vision, when no cause for the disease could be detected.

8.—*Squint from Opacities.*

When there is a partial obstruction to the passage of the rays of light through the pupil, the disease sometimes produces a squint. This generally happens either from corneal Speck, or from Cataract.

In cases of corneal speck, accompanied by a Squint, the speck is so situated on the nasal portion of the cornea, that unless the eye-ball is rolled very much inwards, the rays of light coming from an object cannot pass through any part of the pupil to reach the retina. The eye-ball, therefore, being kept constantly inwards, acquires a Squint. In one case where the nasal portion of each cornea

had become obscure, the person had a most inveterate Squint in both eyes.

It is chiefly those who have cataracts from birth who Squint. In that disease, it often happens, that only a portion of the pupil is obscure ; and when this is the nasal part, the eye, in order to look at objects, is always rolled inwards.

CHAP. XLIX.

OF DOUBLE VISION.*

IT has been demonstrated by writers on Optics, that when an object is situated at the concurrence of the optic axes of the two eyes, it is seen by both eyes in one and the same direction, and hence single vision is obtained : But if, from disease, the axis of one eye be so distorted that it cannot be directed to an object at the same time with the axis of the other eye, there is then produced a double image of that object. Thus has arisen the opinion of there being

* Dyplopia.—Suffusio multiplicans.—Visus duplicatus,—Bèvue.—Doppelsichtichkeit.

corresponding points in the two retinae. The phenomena of diseases of the eye, however, refute this doctrine, and afford striking illustrations of the powers of habit in teaching us to see single with two eyes. It is by no means unusual for a person to acquire a squint suddenly,* which is at first accompanied with double vision, and to find by degrees objects appear single. A person had one of his eyes distorted by a blow, and for some time every object appeared to him double ; but by degrees those most familiar became single, and in time all objects appeared so, though the distortion continued. In like manner, it sometimes happens, that the pupil of one eye is deformed, and its position altered, so that the person sees double ; but after a while vision, even under these circumstances, becomes single.

Double vision arises either from some organic change in the eye, or from some

* See Chap. XLVIII.

derangement in the functions of the retina.*

It has already been noticed, that those who squint often have double vision, when the squint is recent ; it has also been observed, that when a change takes place in the position of the pupil of one eye, or when there is more than one aperture in the iris, vision becomes multiplied. The same thing takes place from alterations in the form of the cornea and lens. In the first of these cases of double vision, the patient sees double only when he looks with two eyes, whilst in the others he sees all objects double with the diseased eye.

A person affected with double vision seldom sees the two objects equally distinct. Commonly the most distinct image is the real one ; consequently, the person who has this defect in vision does not often commit mistakes in discriminating the real

* May not the sensation of two bodies, which is produced by the presence of one between two fingers when crossed, be explained on the same principle ?

from the false image. This, however, is not always the case.

Some people only see objects double which are at a distance, and sometimes objects appear double only when looked at in certain directions.

Double vision sometimes takes place when a person has strained his eyes by looking at minute objects in candle-light; but this disappears when he shuts his eyes for a moment.

Double vision sometimes affects those who make frequent use only of one eye. I have known several instances of officers of the navy who became affected with double vision from fatigue caused by looking through telescopes.

A Catholic Clergyman experienced a kind of double vision whilst he held down his eyes to read, the letters appearing to cross each other. This confusion ceased when he shut one eye, or when he elevated the book to the same height, or higher up than his eyes. He found, however, some

difficulty if the book was placed at the same time to the left. Morgagni conceived that this arose from a weakness in the abductor and depressor muscles of the right eye.*

A young man was frightened and dazzled by lightning when looking at the clouds. An hour afterwards he saw double. On examining his eyes he was observed to squint.†

Double Vision is frequently a sympathetic affection accompanying diseases of the primæ viæ, or encephalon. A gentleman eat a small piece of pastry between meals, and had immediately uneasy feelings about the stomach. On walking in the open air his sight became dim, and he had double vision, accompanied with severe headache, all which went off the following day.

A young gentleman had double vision which came on three weeks after receiving

* Letter xiii. a. 20

† Leich. de visu duplicato.

a blow on the forehead. In order to remove a portion of bone which afterwards became carious, I made an incision through that portion of the integuments traversed by the Frontal nerve, which was also divided. In a few days he saw single, and the eye which was turned outwards resumed its natural position.

CHAP. L.

OF OCULAR SPECTRA.*

A PERSON affected with this disease sees one or more bodies floating before his eyes, apparently, situated between the eye and the surrounding objects.

These Spectra assume various forms ; sometimes resembling black spots, flies, or insects, pieces of net-work, or streaks. Sometimes they are of a red colour, and resemble flowers with numerous petals, or falling stars.†

The Spectra are either fixed or move-

* *Muscae Volitantes*—Images before the eyes—*Hypochyma*—*Suffusio*—*La Berlue*.

† *Visus Lucidus*—*Photopsia*.

able, and their appearance is either temporary or permanent.

Sometimes the disease is so slight, and of so short duration, as to be little remarked by the patient ; whereas, in other instances, it continues many years, and is a great hindrance and inconvenience to vision.

The Spectra that are fixed are so called, because they always keep the same position, in respect to the axis of vision. If a person with these spots keeps his eyes unmoved, by looking steadily at the corner of a cloud, at the same time that he observes the spectra, he will be convinced that they have no motion but what is given to them by the eye in pursuit of them.

Those Spectra which are moveable float about even when the eye is stationary, and are sometimes above, below, or at the side of the axis of vision ; but they are never in it. These are sometimes seen when the eye-lids are closed.

Spectra appear either in one or in both eyes.

Short-sighted people are least liable to this affection.

Spectra are most troublesome when the sky is clear and serene, or when the person looks at a resplendent object. They are also most distinct when the person looks directly up towards the sky, or at distant objects ; and in proportion as the object looked at is near, the less distinct the spectra are, and when at the nearest point, they entirely disappear.

These ocular Spectra arise from different causes, and depend either on a morbid condition of the retina, or an opacity of some of the parts of the eye which are naturally transparent. In the latter case, the opacity must be in the posterior part of the vitreous humour, because experiments, and the principles of optics, prove that no opacity of the aqueous, crystalline, or anterior part of the vitreous humour, can throw a partial shadow on the retina.

It has already been observed,* that,

* See Chap. XLV.

under certain circumstances, the pulsations of the arteries of the retina may be seen ; and that various colours produced by pressure of the finger, or by a stroke on the Eye, seem to arise from unequal pressure on different parts of the retina. It is, therefore, extremely probable, that one and by far the most frequent cause of Spectra is a change in the state of the vessels of the retina. In some cases, this seems to depend on an inflamed state of the vascular membrane of the retina ;* in some, on a state of plethora ; and in others, on a state of what is usually called debility. Hence, in all cases of inflammation, affecting the internal structure of the eyeball, various spectra appear, as sparks of fire or drops of blood. Spectra almost constantly appear before the eyes of those who have plethoric symptoms, and they generally precede a fit of apoplexy. Black spots are often perceived on the bed-clothes by patients with fevers, or inflammation of

* See Chap. XLIII.

the brain and its membranes. Spectra are also observable when the eyes are weakened by fatigue, or exposed to bright and dazzling lights ; and it frequently happens, that persons of delicate constitutions are affected with them, more particularly those whose digestive organs are deranged. The influence of diseases in the *primæ viæ* on the functions of the Retina has already been noticed,* and a variety of curious appearances, affecting vision from particular kinds of food, or from whatever disturbs the digestive process, may frequently be observed.

But there are ocular spectra, as Dr. Darwin observes, which are derived from another source. After looking at any luminous object, as the sun, for a short time, so as not to fatigue the eye very much, part of the retina becomes less sensible to smaller quantities of light. Hence, when the eye is turned on less luminous parts of the sky, a dark spot is seen resembling the

* See Chap. XLV.—4.

shape of the sun. It must, therefore, be from habit and want of attention, that we do not see such spots in all objects every hour of the day.*

* Zoonomia.

CHAP. LI.

OF THE DISPARITY IN THE VISION OF THE TWO EYES.

IT seldom happens that any of those organs of the body which are in pairs are both equally perfect. The two kidneys and the two testes generally differ in size ; and there is often an unequal secretion of milk from the two mammæ There is frequently a disparity between the two nostrils ; and few people hear equally acute with both ears.

Besides this inequality in those organs

of which there are pairs in the system, the two sides of the body differ from one another. In all animals, as well as in man, a distinct difference may be observed in the two sides of the countenance ; the food is usually masticated by the teeth of one side of the mouth ; and there is generally a remarkable difference in the strength and vigour of the limbs of the right compared with those of the left side of the body. These observations are exemplified in the Eyes, for the vision of the two eyes will seldom be found equally perfect, and in most people the right is stronger than the left eye.

Throughout the animal kingdom, those animals who have two or more eyes employ them to extend their sphere of vision, but man makes use of both eyes chiefly as one organ, little advantage being probably derived from being endowed with a pair, except that of diminishing the risk of injuries and disease.

Few are aware of the disparity that often

exists between their eyes until, from some accident, they are led to make the comparison ; and it is by no means unusual to meet with instances of people who, in making this experiment, have discovered that one eye was entirely blind.

It will generally be found, that not only the right is more perfect than the left eye, but when a person is apparently looking at an object with both eyes, generally only one of the eyes, and that usually the right one, is directed to the object. To demonstrate this, let a spot be covered with the point of a finger when looking at it with both eyes. If the left eye be closed, the point of the finger will continue to appear to cover the spot, and to preserve the same relative situation ; but if the right eye be closed and the left opened, then the relative situation of the point of the finger and spot appear altered, the spot being uncovered ; proving that, in directing the finger to cover the spot, the right eye had alone been employed.

It might be expected, that a difference in the vision of the two eyes would produce a confusion in the image. This, however, is not the case, as appears both by the foregoing experiment, and from the effects of disease. If the lens be extracted from one eye, the vision of the other eye being unimpaired, the imperfect sight of the one eye does not usually interfere with the perfect vision of the other ; and, as has already been mentioned, when treating of double vision, the inconvenience arising from that imperfect sight is soon cured by habit, even when it has arisen from some organic change.

The disparity of the two eyes depends on different causes. In some instances it is produced from a difference in the convexity of the cornea, some people having both a long and a short-sighted eye. In other instances, the difference appears to arise from some imperfection in the retina.

I once saw a child in whom there was

a distinct difference in the size of the two eyes, which the parents remarked at birth.

Congenital differences in the two eyes are sometimes hereditary.

CHAP. LII.

OF THE INVOLUNTARY MOTION OF THE EYE-BALL.

IN some people the eye-ball has a constant tremulous motion, which is usually congenital; but, in some instances, it comes on at a later period of life, when it is usually connected with disease of the retina.

I have already mentioned,* that the iris is liable to a kind of undulatory or tremulous motion. This is often accompanied with an involuntary rolling motion of the eye-ball, but each of these affections in some cases exists separately.

* See Chap. XXIII.

The involuntary motion of the eye-ball often accompanies amaurotic affections and congenital cataract; and, as far as I have been able to observe, this state of the eye-ball always indicates, to a greater or less degree, some disease of the retina.

The involuntary rolling of the eye-ball varies in the rapidity of the motions in different instances. Sometimes it is a mere trembling, whilst in others the movements are both rapid and extensive. Buffon saw it to such a degree, that it was impossible to know the point to which the person wished to direct his eyes.* I have seen a boy, about ten years of age, who has this involuntary motion of both eyes, accompanied with no other disease, and who, when an infant, his eyes were discerned to move with such rapidity that the cornea could never be distinguished, nor the state of the anterior chamber ascertained. Since his birth, the rapidity as well as the extent of the motions have

* Boyer, *Oeuvres Chirurgicales*.

gradually diminished, and the disease now exists only in a slight degree.

The involuntary motion of the eye-ball is generally much increased by mental agitation.

This disease usually affects both eyes, though in some cases only one eye is affected.

In the Albino the eyes have a trembling motion. Two sisters, who had hair of a remarkably white colour, and whose eyes seemed tender to ordinary light, had their eyes constantly agitated.

Those who have this affection have usually some imperfection in their vision, but this varies according to the nature of the accompanying disease. In general, they require to hold the object very close to the eye, and knit the eye-lids.

A child, on whom I had operated for congenital cataracts, and whose eyes had this involuntary rolling motion, when he looked at an object minutely, he brought it near the nose, and pressed the eye-ball

with the point of the finger; by which contrivance alone he could distinguish small bodies. This appeared to me to improve his vision, more by keeping the eye steady, than altering the length of the axis of the eye-ball. A lady, however, who had not this motion in her eye, but could see a small object distinctly, in order to read, was obliged to squeeze, in a similar manner, the eye-ball with the point of her finger.

CHAP. LIII.

GENERAL REMARKS ON THE SCLEROTIC COAT.*

THE Sclerotic coat is a membrane of the fibrous class, resembling very much in structure, and being considered by some anatomists as a continuation of the neurilemma of the optic nerve.

The chief use of the Sclerotic coat seems to be, to give that form which it is necessary for the eye to possess as an optical instrument ; and, to serve this purpose the more completely, a considerable portion of it is found to be in some animals osseous.

The Sclerotic coat is of considerable thickness, though not equally so through-

* See Chap. XXIII.

out, being stronger posteriorly, and becoming gradually thinner anteriorly.

It is firm and tough, being composed only of one lamina, the fibres of which are firm, white, silvery, and tendinous; irregularly disposed, both in longitudinal and transverse directions.

The Sclerotic coat is pierced by numerous holes for the passage of arteries, veins, and nerves; the posterior ciliary arteries passing through the openings which are formed near the optic nerve, and the anterior ciliary vessels, through those a little behind the cornea. The veins which form the *vasa vorticosa* of the choroid coat and the ciliary nerves, penetrate the sclerotica obliquely about its middle.

The blood-vessels which are distributed in the sclerotic coat itself, are few in number, and they have but few capillary ramifications; a peculiarity of structure belonging to fibrous textures.*

In examining some of the diseases of

* Bichât, Anatomie Descriptive, Tom. ii. p. 430.

the eye, it is of great importance to be able to discriminate the changes which take place in the different sets of vessels of the sclerotic coat, as the appearances of inflammation or turgescence in these are different, when the iris, the choroid coat, the sclerotic coat itself, or the conjunctiva covering it, is affected.

The external surface of the Sclerotic coat is covered by a delicate cellular tissue, which lies between it and the conjunctiva. Its interior surface is smooth and polished, having no connection with the choroid coat but by some vessels and nerves ; and it is kept constantly moist by an exhaled fluid.

The Sclerotic coat has little or no sensibility in its natural state, and no nerves have been traced into it.

As it does not seem to be concerned in the performance of any of the peculiar functions of the eye, merely serving as a cup to contain the parts destined for the sense of sight, the sclerotic coat is not liable to many Diseases.

The Sclerotic coat is occasionally affected by Inflammation, and it is subject to Staphyloma.

Sometimes the Sclerotic coat becomes flaccid and yielding when pressed by the finger, so that if the humours be discharged, instead of preserving a globular shape, it collapses. I have never observed this change without its being accompanied by a complete disorganization of the internal parts of the eye.

Sometimes the Sclerotic coat becomes unusually tense, so that the eye-ball feels harder than natural.

The Sclerotic coat is capable of great extension. This appears both in staphyloma and in fungus hematodes.

I have known the Sclerotic coat ruptured from a blow. A woman got a sharp blow with a fist on the eye, and there was a distinct fissure made in the sclerotic coat, at a little distance and parallel with the cornea. The conjunctiva covering this cleft had not given way, so that the transparent parts within the posterior chamber

shone through the fissure. A man struck his eye against a stick, and ruptured the superior part of the sclerotic coat to the extent of half an inch, in nearly a semi-circular direction. A portion of vitreous humor with its capsule protruded through the wound.*

When the Sclerotic coat collapses, it usually becomes very much thickened, and whiter than natural. Morgagni observed, in an eye which was shrunk, the sclerotic coat unusually hard and thick.

When the vitreous humor is absorbed, and the sclerotic coat collapses, it usually becomes puckered at four points, forming the globe into as many segments; which is probably produced by the action of the recti muscles.

The Sclerotic coat, like other fibrous membranes, has been found ossified. Blazius found “a bony scale inherent in the sclerotic coat.” †

* See Edinburgh Medical and Surgical Journal, 1816.

† Morgagni, Ep. lii. Art. 30.

Mr. George Young saw a child who was born with no vestige of an eye-ball, except a body like a small pea, which had some resemblance to a shrunk sclerotic coat.

CHAP. LIV.

OF INFLAMMATION OF THE SCLEROTIC COAT.*

TH E Sclerotic coat is seldom the primary seat of inflammation, but it frequently participates in inflammation of the adjacent textures. Though what is commonly called the white of the eye often becomes inflamed, it is seldom that the red vessels are seated in the sclerotic coat. The redness usually arises either from the conjunctiva, the choroid coat, or iris being inflamed. In the first case, the vessels are distributed over the whole surface of the

* Sclerophthalmia.

eye, being moveable with the folds of the conjunctiva : In the second, the posterior ciliary arteries and veins are enlarged ; and in the third, the anterior ciliary vessels are chiefly affected.

It has already been observed, that the Sclerotic coat is more or less inflamed when the substance of the cornea is affected with inflammation,* and as Rheumatism usually affects fibrous membranes in other parts of the body, it is extremely probable that in the Rheumatic Ophthalmia the disease is chiefly seated in the sclerotic coat ; for when rheumatism attacks the eye, I have frequently observed, that the blood-vessels on the white of the eye seemed neither to be those of the conjunctiva, nor the ciliary vessels, but a general redness pervading the whole sclerotic coat. In corroboration of this opinion, it may be remarked, that when the Rheumatic Ophthalmia subsides, the sclerotic coat has generally lost its natural pearl

* See Chap. II. Vol. I.

whiteness, and acquired a dingy yellow hue. The pain, too, in Rheumatic Ophthalmia, is usually seated in the head, and parts of the face surrounding the orbit, probably arising from the similarity, or, as some have supposed, from the continuation of structure between the sclerotic coat, *dura mater*, and *periosteum*.

As in other fibrous membranes, there is no subsequent thickening, opacity, or adhesions, when the sclerotic coat has been inflamed ; but it sometimes happens that puriform matter collected in the posterior chamber ulcerates, and forms an opening through the sclerotic coat.

CHAP. LV.

OF STAPHYLOMA OF THE SCLEROTIC COAT.

STAPHYLOMA of the sclerotic coat is a rare disease. Richter says he has seen only a single instance of it, and Scarpa never observed one ; several cases, however, have fallen within my observation.*

A young man, who had at a distant period suffered from severe inflammation in his eye, had the anterior chamber much diminished, the pupil irregular, and the vision destroyed. On the sclerotic coat of this eye were several small tumours at a little distance from its union with the

* See Plate XVIII. and Plates of Staphyloma, in Vol. I.

cornea. These tumours were of a dark blue colour; felt soft to the touch; and seemed to contain a fluid within a delicate membrane.

In a few instances where the eye had suffered from internal ophthalmia, I have observed the whole eye-ball enlarge, and the sclerotic coat become distended, acquiring the blue appearance of staphyloma, at that part where it unites with the cornea.

Staphylomatous tumours sometimes form on the sclerotic coat in consequence of injuries. A small tumour of this kind is represented in Plate XII. fig. 3.

There is another disease of the sclerotic coat described by Scarpa, of which I have never seen an example. In two eyes affected with this disease which Scarpa dissected, the eye-ball had assumed an oval shape, and was larger than the other. On the posterior hemisphere, and on the temporal side of the entrance of the optic nerve, the sclerotic coat was elevated in the form

of an oblong tumour the size of a small nut. The humours were changed : the retina was deficient within the staphyloma ; and the choroid and sclerotic coats forming the tumour were so thin as to admit the light.

EXPLANATION
OF THE
Plates.

Humor effused in the Pupil in which a red vessel is destroyed



Humor effused in the Pupil in which a red vessel is destroyed



Humor effused in the Pupil in which a red vessel is destroyed



EXPLANATION

OF THE

PLATES.

PLATE X.

THIS Plate is intended to illustrate the appearances and effects of Inflammation of the Capsule of the Aqueous Humor.

Fig. 1.—Represents the peculiar appearances which the blood-vessels assume in that affection, as well as the kind of muddiness and opacity of the anterior chamber. The drawing was made from the eye of a boy thirteen years of age, whilst the inflammation was in its active stage.

The vascular trunks divide into different branches, which do not reach the cornea, but penetrate the sclerotic coat at some distance from its margin, and form a red ring parallel to its circumference. These are probably the anterior ciliary vessels enlarged. The inferior hemisphere of the cornea is clouded and obscure, and the pupillar opening filled with albumen.

The appearances in this drawing may be compared with the other inflammations which have been delineated in Plate I. Volume I.

Fig. 2.—Shows a portion of concreted albumen adhering to the surface of the iris, whilst, at the same time, the whole iris has acquired a greenish colour, from a deposition of albumen throughout its substance, as well as from a thickening of the capsule of the aqueous humor.

In some cases, this albuminous effusion disappears along with the inflammatory symptoms; but in others, particularly

where these have not been speedily subdued, the albumen remains permanent, as in the example here represented.

Fig. 3.—The albuminous effusion is confined to the pupillar opening, which, in this case, is completely filled with a portion of a yellowish coloured substance, to which a red vessel may be seen coming off from the edge of the iris, to be distributed through it. The form of the pupil is also altered from adhesions which have taken place between the albumen and edge of the iris.

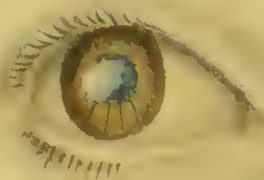
These appearances were the consequence of tedious inflammation, and are to be frequently observed in eyes that have suffered from Gout.

PLATE XI.

THE three figures of this plate are intended to illustrate different effects of Injuries of the anterior chamber of the eye.

Fig. 1.—This drawing was made from the eye of a boy who, six weeks before, had a hog's bristle thrust into the anterior chamber. An opaque white matter, resembling a flake of snow, extends from the lens, which is also opaque, through the pupil, and comes nearly in contact with the cornea. Some inflammation which

• Membranous opacity, removed by the operation of Couching



• Membranous opacity on the anterior Chamber after the operation of Couching



• Membranous opacity on the anterior Chamber after the operation of Extraction



followed the injury soon abated, and all this opaque matter was ultimately absorbed. It is probable, that, in this case, the bristle had penetrated not only the cornea, but also the capsule of the lens, thus allowing the thinner parts of the lens to come through the wound into the anterior chamber; where they immediately became opaque. This appearance is very different from that produced by inflammation of the capsule of the aqueous humor, and precisely resembles the effects of the operation of *Keratonixis*, where the capsule of the lens is wounded by the point of the needle. I have several times had an opportunity of observing similar effects of injuries to that represented in this drawing; in all of them the opaque matter has been ultimately absorbed.

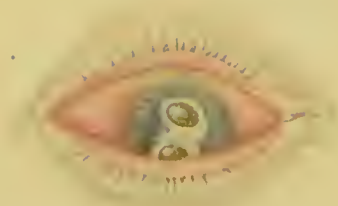
In *Fig. 2.*—The whole anterior chamber is filled with a yellow-coloured matter, whilst the conjunctiva covering the eyeball is so much inflamed, as to produce

what has been called *Chemosis*. The lens of this eye had been couched a few days before the drawing was taken, and though vision was not restored, yet the effused albuminous fluid was finally absorbed.

Fig. 3. — This represents the appearances of a net-work of lymph, as referred to in p. 14, after the extraction of a cataract. Towards the inferior edge of the cornea, a white semicircular cicatrix is perceptible; the pupillar opening is of a full size, and throughout the whole anterior chamber may be perceived filaments of coagulated albumen interwoven in various directions, so as to form a sort of net-work. This case is narrated by Beer.

Flakes of coagulated albumen are often found floating in the anterior chamber, or loosely attached to the iris, of the eyes of horses and other animals.

Discharge from the eye (C)



Discharge from the eye (D)



Inflammation with Discharge (E)



PLATE XII.

Fig. 1.—Is intended to illustrate the appearances of Prolapsus of the Iris, in consequence of ulceration of the cornea.

In this case, two Ulcers, such as have been delineated in Plate V. fig. 2., had penetrated the cornea, given an outlet to the aqueous humor, and portions of the Iris passed through the opening. The whole cornea has become clouded and vascular, and round each portion of iris there is an opaque white circle, produced from a substance resembling wet chalk ;—an appearance rather unusual.

The whole white of the eye is considerably inflamed.

The two next Figures are intended to illustrate the effects of Injuries of the Iris.

Fig. 2.—Represents a small portion of Iris torn from its attachment with the ciliary ligament. In this instance, the laceration was the consequence of a blow with a whip, which did not produce any other injury, and was followed by no defect in vision.

Fig. 3.—In this case, the whole Iris, except a small portion, is destroyed, the person having had his eye wounded by a thorn.

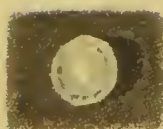
A small Staphylomatous tumor has arisen at that part of the sclerotic coat where the thorn entered the eye.

This man could see so as to be enabled to read, by looking through a small hole made in a card.

.1°7.



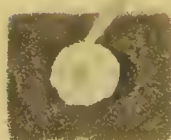
.1°2.



.1°3.



.1°4.



.1°5.



.1°6.



PLATE XIII.

No. 1. and 2.—Are drawings of two Congenital Cataracts, in both of which the central part of the lens is converted into an opaque white or chalky-looking substance.

In No. 1.—The central opacity has a triangular form, and is embedded in the transparent lens.

In No. 2.—The central opacity has a more oval form. Exterior to it there is another opacity, resembling what is met with in the more common kind of cataract,

and the external margins of the lens remains perfectly transparent.

No. 3. — Shows the radiated appearance which the crystalline lens sometimes assumes in Cataract. The rays come from the centre of the lens, but are lost towards its circumference. The central part is of an amber colour, and of a firm consistence, whereas, towards the circumference, the amber hue fades into an opaque leaden grey, the lens becoming much softer, and nearly pulpy.

The drawing was made from a lens recently extracted from a middle-aged patient. Its appearance in the eye was of a pale grey colour.

No. 4.—Shows a Capsular Cataract after being removed from the eye. In this case, the anterior portion of the capsule has become perfectly opaque, and acquired a great degree of thickness, being as thick as a common wafer, whilst the posterior por-

tion, is of its natural thinness and transparency, and is raised on the point of a pair of forceps. This cataract was removed from a young man who had suffered severely from ophthalmia. When the inflammatory symptoms had subsided, a dark yellow opaque body appeared behind the pupil, resembling fig. 3. Plate X. the pupil being immovable from its adhesions to the opacity. This opaque substance was the thickened capsule, on extracting which, the vitreous humor was found converted into a watery fluid, and the retina had lost its sensibility.

The two remaining figures show the appearances of Ossification of the Lens and Capsule.

No. 5.—Is a perpendicular section of a lens, showing its appearance when ossified, as described in Chap. XXXIV. The Ossification is seen commencing in the centre of the lens, and extending towards its cir-

cumference in the form of concentric bony laminæ. The central portion was a dark brown coloured and hard bone; the exterior laminæ were of a paler colour, and more friable.

No. 6.—Represents an Ossification of the Capsule of the lens. In this case, nearly the whole capsule, particularly its anterior portion, was converted into a shell of bone. Where the shell is not complete, the dried lens is seen lying within it. The Ossification was in this case of the thickness of paper, and had all the external characters of bone. The case is particularly described in Chap. XXXVIII.

.177.



.172.



.173.



.174.



.175.



.176.



PLATE XIV.

THESE figures show several different kinds of Cataract.

No. 1.—Shows the appearances of the more usual form of the Capsular Cataract in the adult, where the anterior portion of the capsule has become much thickened, and of a pearl-white colour.

No. 2.—In this eye may be perceived the usual appearances of *Glaucoma*, or of cataract combined with a dilated and immoveable pupil. The lens has a bluish-

grey colour, but not of an equal degree of opacity, and the shade varied so much when the eye was inspected in different directions, that those who looked at it compared it to a cat's eye.

The pupil was permanently dilated, and at one part a portion of the iris is eroded. The lens was extracted, and found to be soft. The lady from whom the drawing was taken had an incipient cataract and Amaurosis of the other eye.

No. 3.—Exhibits one of the more usual appearances of the Crystalline Cataract. The lens is of an opaque bluish-grey colour, and of an equal shade throughout. The iris is beautifully streaked. The other eye was sound. The drawing was made from a girl three years of age, and the cataract had been perceived several months.

No. 4.—This figure represents the peculiar form of cataract which may be denominated *Laminated*. There is, in the pupil,

a very opaque white central spot, and around it a less opaque ring, the limits of both being accurately defined.

No. 5.—This figure represents a Cataract formed in consequence of an Injury of the lens. A needle had penetrated the anterior chamber of a young lady's eye, torn the edge of the iris, and punctured the lens. The pupil is seen of an irregular oblong form, and is separated into two portions by a slender filament of iris, detached from the edge of the pupil; behind one portion lies the opaque lens, whereas the other remains perfectly transparent.

In cases of this description, the wound which renders the lens opaque, seems to destroy its organization.

The drawing was made three months after the accident.

No. 6.—This represents a lateral view of a conical-shaped opaque body, whose base rests on the capsule of the crystalline lens,

and whose apex reaches the cornea. The pupil was quite moveable, vision was impaired, and both eyes had been affected with the disease from birth. The drawing was taken from a boy four years of age.

This peculiar form of cataract, which I have denominated *Pyramidal*, is described in Chap. XXXVIII.

.177.



.172.



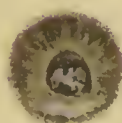
.173.



.174.



.175.



.176.



PLATE XV.

IN this Plate are illustrated some of the diseases of the Crystalline Capsule.

No. 1.—This is an example of the anterior portion of the Crystalline Capsule become very much thickened and opaque from inflammation. The pupil has lost its circular form, and is immoveable, whilst the opaque body behind it is of a pale grey colour.

No. 2.—Congenital Cataract in which

both the Lens and its Capsule are opaque. There is a green opacity throughout the lens, and in the capsule there are numerous spots. The pupil being dilated by belladonna, the whole opacity is exposed to view. This figure is copied from the work of the late Mr. Saunders, and exhibits very distinctly the appearances of one form of diseased capsule.

No. 3.—In this figure are contrasted the appearances of an opacity of a portion of the Capsule of the lens, and Cornea. The opaque portion of capsule hangs from the upper edge of the pupil, whilst the opacity of the cornea is opposite to the inferior portion of the iris. In this case, the operation of extraction was performed in the usual manner, and no bad effects arose from the incision being carried through the diseased portion of cornea. Whilst making efforts to remove the capsule, the lens escaped. The capsule thus let loose floated upwards behind the iris, and the pupil

afterwards remained transparent, and vision was restored.

No. 4.—In this instance, the whole edge of the Iris adhered to the Capsule of the lens, and the iris had acquired a convexity, being pressed forwards in its middle part. The capsule has become quite opaque, and a small red vessel passes into it from the edge of the iris. These appearances are very frequent after attacks of Gouty inflammation of the eye.

No. 5.—This drawing shows the appearance of the Pupil and Capsule of the lens, after extraction. The irregularity in its form did not proceed from any injury done to the Iris during the operation, but from a portion of the capsule of the lens, which was pushed through it, adhering to the wound of the cornea, and become opaque.

No. 6.—Circumscribed opacity of the Crystalline Capsule, in consequence of a punctured wound.

PLATE XVI.

Fig. 1.—Represents an Ossification found within an eye-ball, which appeared to be completely disorganized. The patient died of phthisis, but no history could be obtained of the diseased eye. The general form and shape of the eye were completely changed ; the cornea was opaque, its margin not distinctly marked, and the anterior chamber almost entirely obliterated. The sclerotic coat was easily separated from the parts within, and upon removing it, the cavity was found occupied by a hard irregular-shaped mass of bone. The ossifica-



tion was covered by the choroid coat and iris, these having lost their natural appearance, and no vestige of retina could be detected. The Ossification consisted of two different portions. The upper one was smooth, and a thin hollow shell, which, from its rounded form and position, must have been the Capsule of the Lens ossified. The inferior portion was a very irregular-shaped mass, and appeared to be the Capsule of the Vitreous humor converted into bone.

Fig. 2.—Ossification of the capsule of the lens, and hyaloid membrane, described in Chap. XL. the drawing having been made from a preparation where the parts had been dried, and kept in turpentine, in the collection of Mr. Blizzard, to whom I am indebted for this representation. The ossified capsule of the lens is seen in the centre of the preparation, and is readily distinguished from the other pieces of bone by its smooth surface, and more opaque white colour.

Fig. 3.—A thin cup of Bone which was found between the sclerotic coat and retina. A few thin and easily torn cellular laminae were observed on the external surface of this ossification, which seemed to be the only remains of the choroid coat. At the apex is seen a small rounded perforation, through which passed the retina, to be expanded on the interior surface of the ossification. This eye was Amaurotic, but the particular history of the case was not known. The gentleman was also blind of the other eye, but in it there were no appearances of diseased structure.

In these three figures, the Ossifications in the two first resemble one another, that of the third being quite different.



PLATE XVII.

Fig. 1.—Is the drawing of a Tumor on the Optic nerve from Mr. Heaviside's collection, for which I am indebted to Mr. Howship. The tumor appears to have formed in the *Neurilema* of the nerve, and no further history of the patient was known, than that he was Amaurotic of this eye.

Fig. 2.—Represents a vertical section of the eye-ball, described in Chap. XXIX. p. 70, where a watery fluid had collected between the choroid coat and retina, in

such quantity, as to compress the retina, into a chord, and produce a complete absorption of the vitreous humor.

This drawing represents the anterior portion of the eye-ball, so that the compressed retina is distinctly seen terminating at, and closely surrounding the neural portion of the crystalline capsule.

a, a, a, The outline of the sclerotic coat.

b, b, b, The choroid coat.

c, The Retina covering the neural portion of the crystalline capsule.

d, Section of the Retina compressed into a chord.

The eye in this instance appeared, on a superficial examination, to be affected with cataract, a white substance being seen behind the pupil. An attempt was made to couch what was conceived to be the opaque lens,—a fruitless operation, which gave great pain.

Staphylema of the Sclerotic Coat.



PLATE XVIII.

IN this plate is delineated a Staphylomatous swelling of the sclerotic coat, the cornea being at the same time quite disorganized ; these changes having taken place in an adult in consequence of a severe attack of Puriform Ophthalmia.

END OF VOL. II.

